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QST

june, 1941
25 cents
35c in Canada

devoted entirely to

amateur radio

A.R.R.L.
FIELD DAY
JUNE 7-8





COLLINS 12Z Remote Amplifier

NUMBER OF MIXING POSITIONS: Three, with a switch arranged to select fourth input.

GAIN: Approximately 85 db.

CONTROLS: Front Access Attenuators (Patented) 2 db per step.

VOLUME INDICATOR: Weston new type 30 instrument calibrated in VU used for reading output level and battery voltages.

TUBES: Three. 2 type 15; 1 type 31.

FREQUENCY RESPONSE: 30 to 10,000 c.p.s. $\pm 1\frac{1}{2}$ db.

NOISE LEVEL: More than 50 db below program level.

INPUT IMPEDANCE: Standard model, 30-50 ohms. A special model supplied for 200-250 ohm input.

POWER OUTPUT: 25 milliwatts at less than 2% distortion.

POWER SOURCE: Batteries suitable for use in the 12Z are standard items of large battery manufacturers. One set of batteries will operate the 12Z approximately 30 hours.

WEIGHT: 12Z with tubes, case, and batteries 28 $\frac{1}{4}$ pounds.

SIZE: 14" wide, 10 $\frac{1}{2}$ " high, 8" deep.

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA NEW YORK, N. Y.: 11 WEST 42 ST.

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QST

devoted entirely to

AMATEUR RADIO

PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.;
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Section Communications Managers of the A.R.R.L. Communications Department

All appointments in the League's field organization are made by the proper S.C.M., elected by members in each Section listed. Mail your S.C.M. (on the 16th of each month) a postal covering your radio activities for the previous 30 days. Tell him your DX, plans for experimenting, results in 'phone and traffic. He is interested, whether you are an A.R.R.L. member or get your QST at the newsstands; he wants a report from every active ham. If interested and qualified for O.R.S., O.P.S. or other appointments he can tell you about them, too.

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"IT SEEMS TO US—"



KEEPING ABOVE SUSPICION

WE WERE talking to some people in the FCC monitoring service the other day. In the course of the conversation they suggested that, in view of the difficult conditions of to-day, every amateur ought to make it a habit to give in each transmission the call of the station called as well as his own call — so as to facilitate identifying and checking up on both sides of a contact. They almost feel that there ought to be a regulation requiring that, and we suspect that it is under contemplation as a rule. In the meantime, they suggest that it would be a very proper form of coöperation by the amateur.

We therefore suggest that we take it on voluntarily, so as to give constant evidence that our hands are clean. We gather that there have been a few smarties who thought they could get away with some DX by simply omitting the call of the other station. But of course the FCC has heard the latter calling them and it has been a dead giveaway. Then FCC simply calls for the log, which shows either a correct or an incorrect record of an improper action, or a miserable attempt at hasty alteration, and those particular hams take Balaam's famous ride.

For ourselves, we have never liked to show the call of the other fellow at the signature of the transmission, much preferring just our own call there as a signature; we like it better at the beginning of the transmission, where it can be of definite help to the other fellow in QRM and particularly if there is any slowness in his changing over. For break-in operation we of course do not suggest that every transmission show both calls, any more than it is necessary to show even one's own on every brief transmission. (See §12.83.) But we do believe that, when the periodic signing does occur in break-in operation, both calls should appear as part of the clean-noses policy.

The international situation is such that even minor infractions can hurt amateur radio like hell. We urge caution, circumspection and restraint. In our estimation it is particularly important that the general tone of amateur radio be above suspicion and completely re-

moved from any matters connected with the war. It is part of our Code of Precautions to confine our talk on the air to radio and personal matters, so that there may be no fear in official quarters that our conversations are unwise. If we're smart we'll stick rigidly to that rule — not because it's a regulation but because we *are* smart.

K.B.W.

OURSELVES

THE editors write many words on this page intended to help us all steer a straight course through ham difficulties but we hope you fellows never get the idea that we at Hq. are a smug bunch who think our own work is perfect. We are rarely satisfied with anything we do, and that is particularly true of our efforts in turning out *QST*.

Any magazine needs a shot in the arm from time to time — the whole publishing art is in a constant state of turmoil. For instance, typographic and mechanical methods frequently improve, and it is one of our duties to analyze these ideas and sift out those that are useful for our gang. We try to work subtly so that no changes are startling, because *QST* is a journal many of us have grown up with and drastic changes might alter its warm touch.

A basic problem that is always with us is that of producing a magazine that will interest all amateurs with their diversified approaches. With the development of our art this has become a complex problem and requires no end of study. Moreover, the needs change as do the times. With our increasing connections with the Services, we inaugurated last month the new department called **IN THE SERVICES** and this month we are starting **THE MONTH IN CANADA** for the VE's. Another new column, **U.S.A. CALLING**, will appear whenever we have material for it. We believe you will find all of these intensely interesting — because they will keep you up to date on what other hams are doing and will bring you into contact with opportunities to serve in the national effort.

How do you like our cover? It is an old friend that has been missing for ten years: a cartoon cover. As of old, this one was pro-

duced by Phil "Gil" Gildersleeve, W1CJD. In addition, we are brightening up the interior here and there in little ways — not too noticeably in any one spot, we hope. Our definite aim is to make the *QST* of to-day a more human and more readable journal. We want it to rate a place in every ham's shack — it should be there and if it isn't, we'd like to know the reason.

C. C. R.

EXIT HETERODYNES

A COUPLE of years ago Jimmy (one-control neutrodyne, single-control superhet, dual-diversity) McLaughlin had an idea for a different kind of receiver to combat 'phone heterodyne interference. Working on it as time permitted, he has brought it now to the point where it has proved its practicability. In its present form it's not simple, nor can it be built for cigarette money — but it does a job! And so we're happy this month to present a description of the system.

As the article sticks to technicalities, we want to describe to you how the receiver works. The heterodyne eliminator, as you will find on reading the article, is the second story of a table-size relay rack, the first story being a conventional communications receiver — any good receiver will do. Between the two is a narrow panel on which is mounted a flip switch: left, center and right positions. For normal tuning we keep the switch in the center and set the i.f. selectivity at medium or broad. We tune in a 'phone signal, observing as we do so that the meter on the upper panel gives a very sharp indication as we go through resonance — much more critical than the receiver's S-meter. That upper meter is im-

portant, and if we want to be ready for interference we have to keep the carrier tuned "on the nose" by its indication. Since this is a ham 'phone band, we hardly get farther than identifying the fellow's call when bang! on comes a 1000-cycle heterodyne which practically blots out the signal we want. We're ready for it, though, so we give the switch a flip and presto! the heterodyne disappears — taking with it most of the interfering sidebands — and our friend's voice comes back; no QRM, no side-band cutting; if anything, improved intelligibility.

It sounds like magic, and very often it actually is. Of course, *all* interference can't be eliminated. After all, there are only two side bands to play with, but even if both of them are QRM'd the interference can be greatly reduced. We've time and again dived into messes of QRM and brought out the guy on the bottom — good enough to understand, if not completely interference-free.

Such a receiver is definitely a de luxe proposition, at least for the time being. Its advantages over ordinary high selectivity such as that afforded by a crystal filter are the absence of attenuation of higher audio frequencies — i.e., no reduction in intelligibility or naturalness — and extremely rapid operation. You eliminate the heterodyne immediately, with no time-consuming critical adjustments. Because McLaughlin's receiver is an elaborate job, incorporating some special components not now available, we haven't attempted to give how-to-make-it details in the article. But the fundamentals are there, providing all the basis necessary for the experimentally-inclined ham to get to work.

G. G.

HAM FORUM AT WILL



Ham Forum, America's oldest program devoted exclusively to the radio amateur, celebrates its sixth anniversary with special broadcast. Now prepared by the hams on the WILL (University of Illinois station at Urbana) staff in conjunction with members of Synton, national collegiate radio fraternity, the "Ham Forum" series was initiated by W9CMZ and W9MLH in March, 1935. Time: Saturdays, 1:15 p.m. CST.

From left to right: Harold Mautner, Jim Cody and Bill Kuznits of Synton; Jim Ebel W9KJV, chief engineer of WILL; Phillip Spradling; Oren Denhart, W9IAW, ham newscaster; Stanley Howell, W9QAF, president of Synton; and Andy Humphrey, W2KBL, Control engineer for the broadcast was Bob Hockfield, W9ZXD, with Ed Hamilton, W9GSS, in the master control room and George Kirkpatrick, W9LGK, at the transmitter.



QST Visits Gallups Island

Radio Instruction for Amateurs Under Ideal Conditions

DO YOU know that the government conducts a radio school where any American citizen between 18 and 23 years of age may go? Besides that he is fed, clothed, well taken care of and receives from \$36 to \$54 per month while attending! It was a startling bit of news to us when Earl S. Burns, W3HEW, of the Coast Guard in Washington, stopped in at Hq. one April day and presented us with the facts. The things he told us about this school were positively amazing. This should look mighty interesting to any high-school graduate with radio ambitions: an opportunity to get a complete radio course at the U. S. Maritime Service's expense and end up with a 2nd class commercial ticket. The U. S. Maritime Service is a voluntary training organization administered for the U. S. Maritime Commission by the U. S. Coast Guard. (The training program of this service is not connected with any governmental organization or body not mentioned in this article. However, the course of instruction is available to all persons having the necessary qualifications.) As a matter of cold fact, it was all so intriguing that we visited the site the very next day!

Hasty preparations were in order and the following 7:30 A.M. found QST's photographer, Frank Beaudin, and Rodimon, WISZ (the only member of the staff who could sneak away from the office that day) aboard a Coast Guard cutter in Boston harbor headed for Gallups Island, where the school is located. The cutter makes two round trips a day out to the Island. The run takes about half an hour. Accordingly, we docked at 8 A.M. and proceeded to put in one of the most crammed days of our careers.

Gallups Island was formerly used by the U. S. Public Health Service as a quarantine station. After being idle for many years the U. S. Maritime Service received permission last May to set up their school on the Island and use whatever buildings were necessary. Work started from the ground up and the interiors of the two long narrow buildings near the waterfront, which comprise the school quarters, were completely done over from bow to stern. Polished masonry floors have taken the place of hard concrete; corridors and rooms have the latest in fluorescent lighting and the heating system is of modern design, all room temperatures being thermostatically controlled. Electric water coolers and ventilating fans were included when the buildings were modernized. The tidiness of exteriors as well

as interiors gives one the feeling that this outfit believes that "cleanliness is next to godliness."

We were first conducted to the office of Mr. D. R. Greenawalt, W1MYW, who is the skipper of the radio school. There we met the instructors and hashed over the problems of radio schools and operators. Requirements for entrance specify two years of high-school math and one year of physics. The individual must pass an elementary examination about radio and be able to handle code at 13 w.p.m. We understand that a ham with the necessary schooling and a Class B ticket would have no trouble in qualifying. A physical examination must be passed in conjunction with the theoretical. Both examinations are given at a government office in the vicinity of the applicant and when passed the lad gets his transportation from point of enrollment to the school and his salary of \$36 per month starts. It is an 8- to 40-week course, depending upon the knowledge of radio and operating ability of the student. The salary is boosted to \$54 per month after three months. The uniform furnished is similar to a sailor's outfit. A health station with doctor and dentist in attendance is on the Island.

The operator enters and leaves the school as a civilian. There is no induction into any branch of the service. If the student feels at any time a desire to quit, he merely goes to the skipper, makes known his wishes, receives the pay due him and shoves off with no strings attached. When the course is completed and the FCC exam passed, the operator may travel back to the point of enrollment at the government's expense.

This school is run purely and simply because Uncle Sam wants to train young men to become loyal and efficient radio operators in the American merchant marine. Entrance requirements are such that those qualifying will be sincere men

When a managing editor gets excited about something you can be pretty sure that it's something to get excited about. He's been bubbling with effervescent enthusiasm ever since returning from Boston with the pictures and story adjoining. The reason for all the excitement will be plain enough after you read about this latest exhibition of interest in the *genus hamus* on the part of Uncle Sam.



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anxious and able to do their utmost in becoming first-class ops. From what we saw of the school program it may well be proud of any "Sparks" who leaves there with diploma tucked under arm.

Our tour started with a visit to a watch-standing room where instruction on receiving watches is given. There are 24 actual receiving positions set up in this room — each position simulates a ship's receiving installation. (Right here it should be understood that all equipment of any description is of the very latest design. This also holds for the 200 typewriters of the super-speed variety that are at the school. When one realizes that \$150,000 has been spent in these rooms for equipment alone, since last June, and the end is not in sight, this may well be appreciated!) Twelve of these receiving positions carry Federal Telegraph equipment, complete with long-wave, short-wave and stand-by receivers, not to mention a crystal detector that is required aboard ship even to-day. Across the room are twelve similar Radiomarine installations, equally complete. Each position has its typewriter, W.E. headphones and 8-position selector box. The operator can switch to one of these positions for communication with any one of the 24 operating positions. Also in front of each operator is a miniature loudspeaker which allows the instructor to direct any position, or all simultaneously, by microphone. This room is strictly for code practice under actual receiving conditions and the instructor at the relay-rack installation in the center of the room instructs and directs this operation.

Much emphasis is placed on the importance of reception under natural receiving conditions, for we were told that, regardless of how well the student has mastered the code shot out by the audio oscillator, he would invariably fall down when operating a receiver and finds it necessary to pull the stuff through the slightest amount of interference.

There are also two classrooms for straight



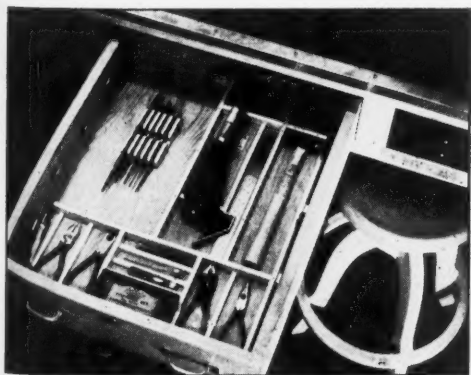
Standard shipboard operating position — practical watch standing section.

code-practice in conjunction with touch typing. The student must be brought up to 25 w.p.m. for straight text and 20 w.p.m. in code groups. This has to be accomplished on the mill as well as by graphite. These rooms also carry the interposition and instructor-student communication system.

There are six senior and ten junior instructors at the school. The texts used for study were made up by the staff especially for this location and are admirably done. We were also shown a couple hundred A.R.R.L. Handbooks that are in service. (DHH — Don't worry, we told 'em there was a new edition in the works.)

Obviously an unbelievable amount of thought has gone into the course of instruction at the school. As one example: Should the code instructor wish to demonstrate to an individual a fault or bad habit in sending, a flip of a toggle and a recording is made at the instructor's desk and then played back to the student.

Boehme heads and Wheatstone perforators are available for automatic work in code reception and transmission. While it is recognized that an operator is fundamentally present to put on paper what comes into the headphones, the instructors know this is only half the battle. This point was demonstrated when we went into their lab. Here, each student rates his own lab space and drawer with complete set of tools. Available at any position are keyed outlets making 110 volts at 60 or 500 cycles and d.c. at hand all the time — assuring that the op will be familiar with whatever juice will be found aboard ship. The student is shown by mechanical-electrical demonstrators how receivers and transmitters work and what to look for and how to service gear in case of failure. This policy of repair is carried out right down to the generators, which are taken apart; armatures tested and practical instruction given



Individual student tool drawer — radio laboratory.

in general servicing and maintenance. Not being satisfied with merely drilling fundamentals into the boys, the instructors have them carry out individual class demonstrations illustrating Ohm's Law with the aid of resistors and meters. (If you don't believe that takes a pile of resistors and meters, take a look at the equipment stored in the stock-room!) Little is done along constructional lines, for the operator will necessarily only need to repair equipment. Lab measuring gear includes oscilloscopes, signal generators and frequency meters in addition to the ordinary equipment necessary for lab measuring runs. A lathe, drill press, bench saw and high-speed buffer and grinder, all with individual motor drives, sit at one end of the lab and are available for repair work or construction. If problems arise that require more equipment, there is a machine or carpenter shop to go to. Power and telephone communication are piped in from the mainland. In case of emergency or failure a gasoline generator kicks in automatically and takes care of the entire load of the school.

There is a standard marine radio installation lab which contains at least one each of transmitting gear that would be found aboard vessels operating under the U. S. Maritime Commission. These rigs are all hooked up to shielded dummy antennas. (It must be appreciated that Boston harbor has enough radio signals present without some practice signals — and even a few inches of radiator can do quite a job of interfering locally.) These outfits range in size from several hundred watts to the emergency gear in small boats. As in the receiving room this setup contains both Federal and RMCA equipment. Also in this room are two direction-finding layouts — one of each manufacture. The instructors see to it that the students thoroughly understand the workings and repairing of transmitting and D.F. gear as well as other equipment in a ship's radio installation. Automatic distress signal alarm equipment, lifeboat transmitting and receiving gear, as well as small-craft radiotelephone equipment and accessories, are in this lab. Tuned r.f. and superhet receivers that are used in service can be found here.

Classes start at 9 A.M. and are finished at 4 P.M. However, classrooms and labs are open at night and instructors are on hand to help with any individual problems from 6 to 9 P.M. Classes are held in mathematics; radio theory; lab and practice instruction; radio procedure, law and regu-

lations; code instruction and practical watch standing — and last an hour apiece. Along with his radio, the student gets an hour of seamanship a day; it may be pulling on an oar out in a whale-boat or a most interesting hour spent in the sail loft taking in the fundamentals of ship equipment, learning to tie knots, make hoists, read signal lights, flares, repair lines and work with pulleys and lifts.

Students get only the rudimentary elements of military training. In general, the organization, administration, rules and regulations follow closely the Coast Guard organization. After seeing the work that has to be covered in the regular course, the reason for this can be appreciated. However, students have a whack at keeping their classrooms spic and span and their floors polished, and learn to keep their quarters clean. They also help in office duties such as mimeographing and drawing.

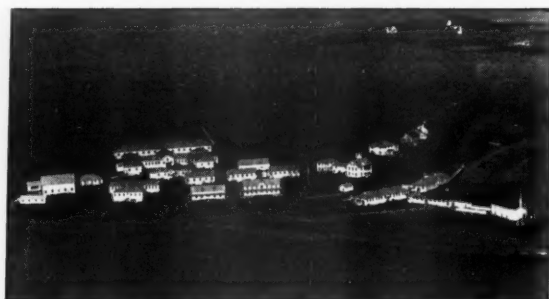
Those who have a hankering for spending free time on the water will find sail- as well as pulling boats available. Weekends start at 1 P.M. on Saturday and the student is on his own, whether he desires to stick around or to take shore liberty. Several forms of recreation are provided for the students while aboard, including movies every night. Local organizations from Boston contribute to the recreation of the personnel, supplying orchestras and dancing partners for parties which are held on the island. Religious services are conducted each Sunday.

Also present on the island is a school in cooking and baking. This group prepares all meals so it is no wonder that the students are fed so well. We had originally planned to visit, get all our dope, shoot photos and depart on the 1 P.M. boat, but we found our job only half done at this time — so we partook of the bill of fare at officers' mess.

We met all the instructors and had a chance to chew the fat with each one. Many of them are ex-hams — we must say "ex" for they all confess to having had no free time since the school started. Having a hand in the carpentry work as well as the electrical and radio installations in conjunction with a class starting shortly after work commenced, meant that a great amount of

installation and planning necessarily had to be done after classes each day. We have never seen a more enthusiastic group of instructors and the brief rag-chewing we had with some of the lads certainly showed they appreciate all that is being done for them. This first class

(Continued on page 19)



U. S. Maritime Service Training Station, Gallups Island, Boston, Mass.

An Inexpensive 56-Mc. Exciter or Transmitter

Ten Watts of Crystal-Controlled Output from Receiving Tubes

BY VERNON CHAMBERS,* W1JEQ

Here is a simple and straightforward layout that delivers 10 watts of crystal-controlled 56-Mc. output at a minimum of cost. You'll be surprised to find how easily and quickly it can be put together. Buggs? We just weren't able to find any!

ANY amateur who has experimented with crystal-controlled 56-Mc. transmission will admit the advantages of starting out with a crystal of comparatively low frequency. It is well worth while to include several doubler stages in a transmitter design to obtain greater stability and ease of operation, even though at first glance this might seem to run to considerable cost because of the numerous circuits and tubes involved.

Nevertheless the cost can be quite reasonable, as illustrated by the low-power transmitter to be described. This outfit employs a crystal-controlled oscillator, three doubler stages, and a push-pull amplifier working straight-through at 56 Mc. with three ordinary receiving tubes costing only \$2.79! The rest of the transmitter components may be purchased for \$14.00, including everything except the crystal.

Circuits

Fig. 1 shows the circuit diagram of the transmitter. Type 6A6 tubes are used throughout. One

* ARRL Technical Information Service.

section of the first tube is used as a triode oscillator on 7 Mc. while the second half doubles to 14 Mc. The two sections of the second tube are used as 28-Mc. and 56-Mc. doublers, and the third tube is a push-pull final amplifier. Capacitive interstage coupling is employed except between the 56-Mc. doubler and the grid circuit of the final, where inductive coupling of a type previously described¹ is used.

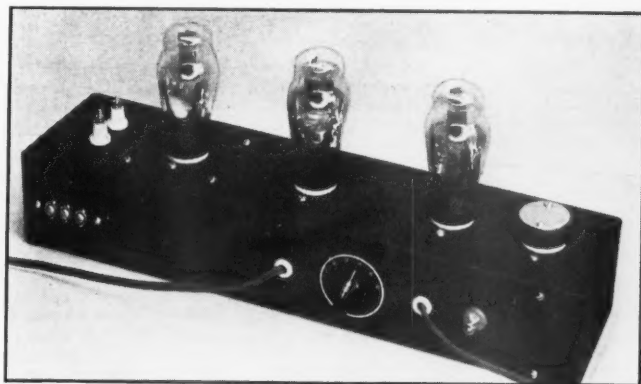
In the triode oscillator circuit parallel plate feed permits grounding the rotary plates of the tuning condenser; since the following grid circuit is series-fed there is no essential difference in r.f. performance between this and the more common circuit with series plate and parallel grid feed. Cathode bias allows the tube to operate at low plate current; it is not necessary to work the oscillator very hard since the excitation requirements of the first doubler are rather light.

The 14- and 28-Mc. doubler circuits are identical except for the cathode resistor, R_2 in the first doubler stage. The second doubler uses no cathode bias because it is desirable to secure as much output as possible to drive the 56-Mc. doubler. Parallel plate feed is employed in both stages.

The 56-Mc. doubler has series plate feed through an untuned plate coil. Since the coupling to the final grid circuit is fairly loose, the coil is made nearly self-resonant so that maximum energy transfer will result. The push-pull amplifier circuit is the standard arrangement for neutralized triodes.

¹ See page 16, *QST* for Feb., 1941.

The plate-voltage terminals are at the left in this rear-view photograph. The meter switch is flanked by the meter cord on the left and the 110-volt line cord on the right. The crystal-current bulb is mounted in a rubber grommet.





In this front view the oscillator, doubler and amplifier tubes run from left to right. The crystal socket is at the left end of the chassis and the output terminals are at the right. Tuning controls are arranged in line along the front wall of the chassis.

Fixed or cathode bias is not required in the last three stages, either for operating or protective purposes. The plate currents of the 6A6's will not be excessive in the event that excitation fails or is purposely shut off. This is convenient in case the oscillator is to be keyed for c.w. work.

Meter switching with shunt resistors (R_7 to R_{12} , inclusive) provides for measuring plate currents, although the meter is not incorporated in the transmitter itself. The wiring of the switch is shown in the main diagram.

Construction

The transmitter is built on a chassis measuring 3 by 4 by 17 inches. One tube is located at the exact center of the top and the other two are $4\frac{1}{8}$ inches to the right and left, respectively. It is advisable to mount the oscillator and doubler tube sockets with the filament prongs toward the front of the chassis and the amplifier tube socket with its filament prongs facing the right end. This arrangement helps keep the r.f. wiring as

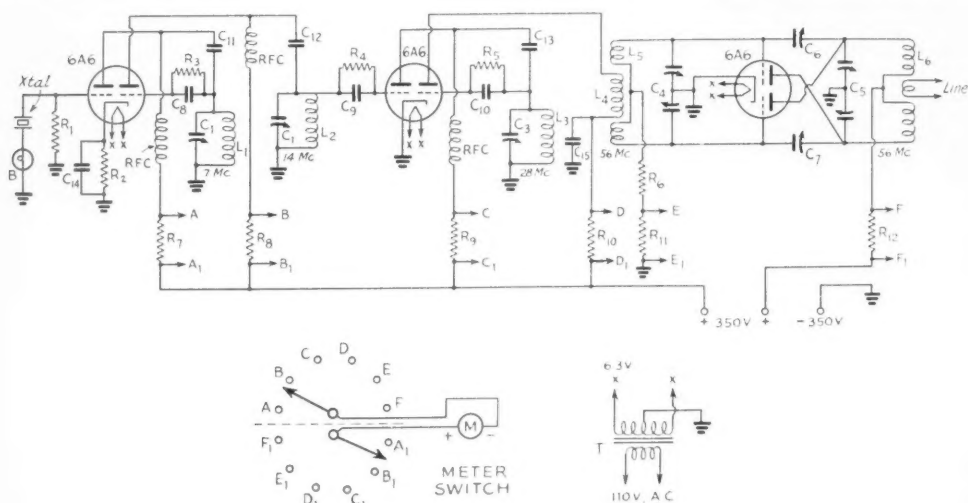
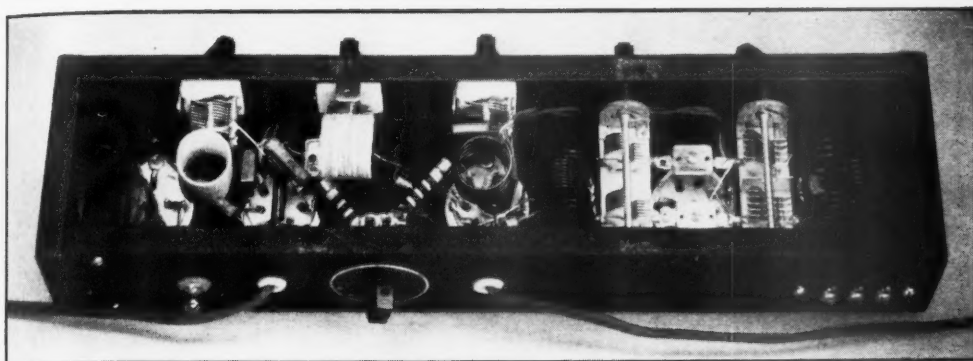


Fig. 1—Wiring diagram of the 56-Mc. exciter-transmitter.

- C_1 — 50- μ fd. variable (Hammarlund HF-50).
- C_2 — 35- μ fd. variable (Hammarlund HF-35).
- C_3 — 15- μ fd. variable (Hammarlund HF-15).
- C_4 — 50- μ fd. per section dual variable (Hammarlund HFD-50).
- C_5 — 15- μ fd. per section dual variable (Hammarlund HFD-15-X).
- C_6, C_7 — 3-30- μ fd. compression-type trimmer (National M-30).
- C_8, C_9, C_{10} — 100- μ fd. midget mica.
- $C_{11}, C_{12}, C_{13}, C_{14}, C_{15}$ — 500- μ fd. midget mica.
- R_1 — 15,000 ohms, $\frac{1}{2}$ -watt.
- R_2 — 500 ohms, 1-watt.
- R_3, R_4, R_5 — 30,000 ohms, $\frac{1}{2}$ -watt.
- R_6 — 1000 ohms, 1-watt.
- $R_7, R_8, R_9, R_{10}, R_{11}, R_{12}$ — 25 ohms, $\frac{1}{2}$ -watt.

- RFC — 2.5-mh. r.f. chokes (National R-100).
- B — 60-ma. pilot bulb.
- Sw — Two-circuit, 6-position selector switch (Mallory 3226-J).
- T — 6.3-volt filament transformer (Thordarson T-19F81).
- L_1 — 21 turns No. 22 d.s.c., close wound, 1-inch diam.
- L_2 — 11 turns No. 22 d.s.c., 1 inch long, 1-inch diam.
- L_3 — 6 turns No. 14, $\frac{3}{4}$ inch long, 1-inch diam.
- L_4 — 9 turns No. 14, $\frac{5}{8}$ inch long, $\frac{3}{4}$ -inch diam.
- L_5 — 2 turns No. 12 each side of L_4 , 1-inch diam., center opening $\frac{3}{4}$ inch. Turns spaced diam. of wire.
- L_6 — 3 turns No. 12 each side of coupling link, $\frac{7}{8}$ -inch diam., center opening $\frac{3}{4}$ inch. Turns spaced diam. of wire.
- Link — 5 turns No. 12, $\frac{7}{8}$ -inch diam., $\frac{1}{2}$ inch long.



This bottom view shows how the tuning condensers are mounted with respect to the tube sockets. The self-supporting coils mount directly on the tuning condensers. The filament transformer is in the lower left-hand corner.

simple and straightforward as possible. The crystal socket and output terminals are each centered $1\frac{3}{4}$ inches in from the ends of the chassis. The second doubler tuning condenser, C_3 , is mounted in the center of the front wall of the chassis. The other variable condensers are to the left and right with $2\frac{3}{4}$ -inch spacing between shaft centers. C_1 , C_2 and C_3 are supported by the chassis wall but C_4 and C_5 are mounted on small metal pillars from the upper side of the chassis. This mounting brings the shafts of C_4 and C_5 in line with the other three.

The rear-view photograph shows the placement of parts on the rear wall of the chassis. Wiring to the meter switch is simplified if the switch is located $6\frac{1}{2}$ inches in from the right-hand end, looking at the rear, where there is a comparatively open spot in the r.f. layout. This point is also convenient to the supply ends of the plate chokes in the first three stages, so that these chokes can be mounted directly to the switch. To save trouble the shunt resistors should be soldered to the switch contacts before the switch is mounted.

The filament transformer and crystal bulb are at the left end of the chassis in the bottom view. The transformer should be kept as far as possible to the left so that it will not be near the r.f. circuits. The bulb is held firmly in the grommet by the stiff leads soldered to its base. The plate supply terminals are out of the way at the extreme left end of the base. Two positive terminals are provided so that a modulator transformer secondary may be connected in the plate lead of the final amplifier.

The rest of the parts are mounted so that r.f. leads will be short and direct; short leads are particularly important in the last two or three stages. The grid connections in the amplifier should be made directly between the grid prongs of the socket and the stator plate terminals of the grid tank condenser, which should be directly above the grid prongs if the unit is laid out as recommended. The plate prongs and the stator sections of C_5 should be cross-connected so that the

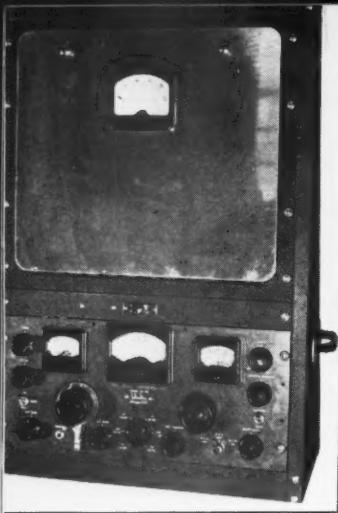
neutralizing condensers, C_6 and C_7 , may be supported by the condenser lugs as shown in the bottom-view photograph. This gives leads of negligible length and perfect wiring symmetry, both of which contribute to good neutralizing. The padder-type condensers used for neutralizing may seem a bit unusual, but since the neutralizing capacity required is small the actual dielectric is mostly air, thus the effect of the mica is inconsequential. The small physical size of the condensers makes them ideally suited for the purpose. The output coupling coil has its ends soldered to lugs which are held in place by the feed-through terminals. The lugs will bend as the position of the coil is varied to change the coupling.

Operation

A power supply delivering 350 volts at 150 ma. is needed. Circuit performance is similar to that to be expected at the lower frequencies; each tank circuit will be in resonance when adjusted for minimum plate current to the tube with which it is associated. These currents should be 10, 18, 18 and 40 ma., in the order listed, for the first four stages. It is quite possible that the values will vary slightly in different layouts, but they should be approximately as given. Tuning of the various tanks should be adjusted to obtain maximum output from the 56-Mc. doubler, as indicated by maximum grid current in the final amplifier grid leak R_6 . If no grid current is obtained it is probably an indication that the coupling between L_4 and L_5 is either too tight or too loose; this coupling is quite critical and therefore deserves careful adjustment. The amplifier grid current should be 25 ma. or more when the coupling is optimum. Each time the coupling is changed, condenser C_4 , as well as the preceding tuning condensers, should be readjusted.

After a grid current indication is obtained the amplifier should be neutralized. Plate voltage should be disconnected from the amplifier but the rest of the circuits should be in normal operating

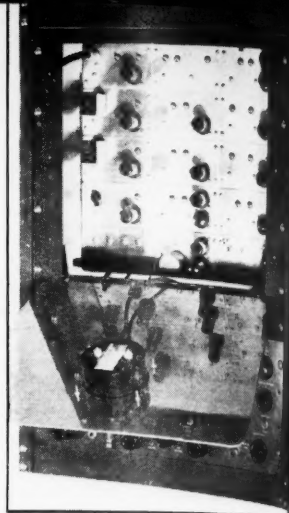
(Continued on page 76)



A Brute-Force Attack on Heterodyne Interference

A front view of the selectable single side-band receiver, in this case an SX-28, is used in conjunction with the side-band selector system which occupies the upper part of the rack. The key switch between the two has three positions giving normal receiver, upper side band alone, or lower side band alone.

The front panel drops down to give access to tubes and controls. The controls are all screwdriver-adjusted and need no attention in regular operation. A cast aluminum catacomb with individual front cover plates gives individual compartments for each stage, with stages readily removable for servicing or revision.



The Selectable Single Side-Band Receiving System

BY J. L. A. McLAUGHLIN*

THIS article will briefly describe a new heterodyne rejection circuit, semi-automatic in operation, and capable of removing several heterodyne beat-notes simultaneously. In effect it is a single side-band radiotelephone receiver with means for rapid selection of the side-band with the least interference and suppressing the one containing the undesired carriers.

A simple heterodyne beat-note is produced by a carrier beating with the desired signal's carrier, the frequency difference between the two being the frequency of the beat, as shown in Fig. 1-A. In Fig. 1-A the interfering carrier is 2 kc. lower in frequency than the desired carrier hence if the lower side-band is rejected the interfering carrier will be eliminated and the beat-note will disappear.

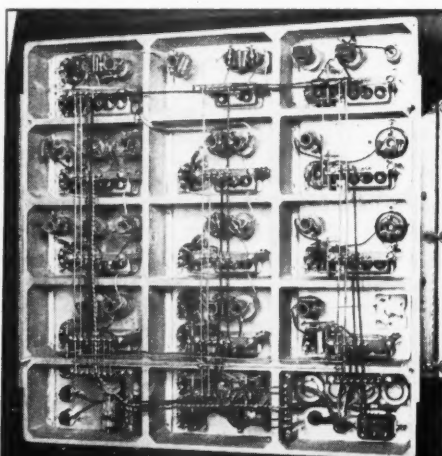
Complex heterodynes are illustrated by Figs. 1-B and 1-C. They are made up of two or more carriers beating with the desired signal carrier and with each other. Fig. 1-B shows two interfering carriers, both on the low side of the signal frequency. Such a combination will produce three principal beat-notes all of which

can be removed by selecting the upper side-band and rejecting the lower. So long as all the interfering carriers line up on one side of the signal frequency all the beats can be attenuated. Fig. 1-C shows interference on both sides of the signal; the number of principal beat-notes in this case is six. Selecting the proper side band will remove five of them, leaving but one to fight.

Fig. 2 is a block diagram of the system. In the actual receiver shown in the photographs, a standard communications receiver is used in conjunction with a special second i.f. system which provides a band-pass amplifier, a means for selecting either the upper or lower side band at will, and a selective amplifier which is used for locating the carrier properly in the pass band.

The 455-kc. input is coupled loosely to the grid of the second i.f. tube in the SX-28 receiver. The audio output of the side-band selector unit is connected back into the SX-28 at the input of the audio amplifier through a relay which simultaneously cuts the receiver diode's audio output. Throwing the key switch (directly over the main dial on the receiver) to the right or to the left

Rear view of the side-band selecting circuits, with back cover off. R.f. is carried from the receiver to the side-band selector through flexible concentric cable.



*7850 E. Jefferson, Detroit, Mich.

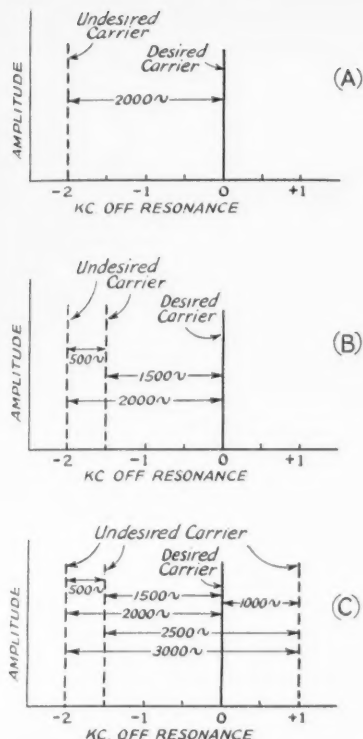


Fig. 1 — Audio beats produced by rectification of two or more carriers. Note that when four carriers are present (C) six beats are produced. Removing the two carriers on the lower side of the desired carrier, before detection, will eliminate five of the beats.

puts current on the relay which disconnects the diode output in the receiver, connects the output of the side-band selector unit and cuts off one side-band. It is possible to use the SX-28 as a normal double side-band receiver when no interference is present by setting the switch in the center.

The 455-kc. signal from the receiver is mixed with the output of a fixed oscillator and converted to 50 kc. Coupled to the output of the mixer tube are two amplifiers. One is a band-pass type with a sharp cut-off on the low frequency side and a fairly flat nose from 50 kc. to 54 kc. The other

Heterodyne interference with 'phone reception arises when an undesired signal is spaced within audio frequency on one side or the other of the desired carrier. Single side-band reception, when either side band of the incoming signal can be selected at will, offers an opportunity for reducing heterodynes, and in many cases completely eliminating them, without affecting the characteristics of the desired signal. Here is a description of a receiving system which does it.

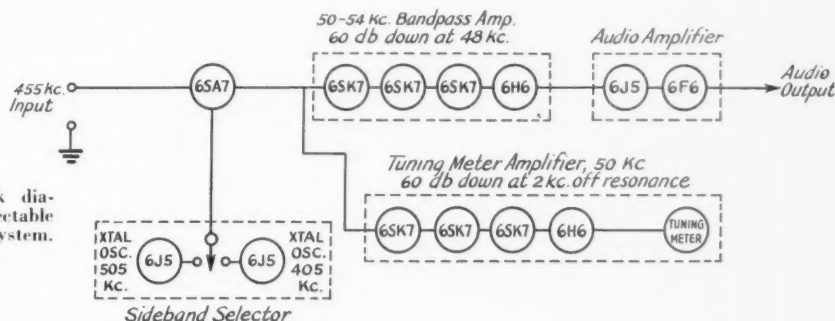
amplifier tunes very sharply to 50 kc. and by means of the microammeter resonance indicator in its output permits setting the signal to the correct point in the band-pass amplifier.

The manner in which the desired side-band is selected is as follows: To produce 50 kc. in the mixer output, an oscillator having a frequency of 455-kc. plus or minus 50 kc. must be mixed with the 455-kc. signal. This calls for an oscillator of either 405 kc. or 505 kc. At first glance it might seem that nothing is altered in the signal's characteristics by using either frequency. Something does happen, however, to the side-bands of the 50-kc. signal with respect to the side-bands of the 455-kc. signal.

If a frequency of 405 kc. is used, the side-bands of the 50-kc. signal will be in the same order as the side-bands of 455-kc. signal. That is, the upper side-band of the 455-kc. signal will be converted to the upper side-band of the 50-kc. signal, and the same goes for the lower side-band conversion. When 505 kc. is used, however, the reverse takes place; the upper side-band of the 455-kc. signal now becomes the lower side-band of the 50-kc. signal and the lower becomes the upper. For example: Take a lower side-band frequency of the 455-kc. signal, say 450 kc., beat this with 405 kc. and the result is 45 kc.; now beat it with 505 kc. and the result is 55 kc. We have reversed the side-band and found the key to an improved single side-band receiver. Since the 50-kc. band-pass amplifier accepts but one side-band, we convert either side-band of the 455-kc. signal, by means of

(Continued on page 74)

Fig. 2 — Block diagram of the selectable single side-band system.





U. S. A. CALLING



FROM time to time we shall publish under this heading data on the calls for radio personnel made by the services and other agencies engaged in defense work. By bringing all the month's data together in one place, interested amateurs can study them all and see for which jobs they are best qualified.

NAVY WANTS 200 ENSIGNS!

ARRL has been asked by the Navy to locate 200 qualified candidates for appointment as communications officers with the rank of ensign in the U.S.N.R., Class C-V(S). While most amateurs think of the Navy in terms of being an enlisted operator, here is a chance for qualified amateurs to get commissions—the best opportunity we have heard of for an amateur desiring to associate himself with the Navy.

Applicants must possess a *scientific college degree* and have a background of amateur or commercial radio; they must be under 30 years of age and preferably between 21 and 26. Appointees will receive an intensive schooling in Navy communications and then given active duty either ashore or afloat. Base pay of an ensign is \$125 a month, plus allowances.

The Navy does not want direct correspondence with applicants at this time. If you fulfill the requirements, are in good health and want this appointment, send a post card to ARRL, West Hartford, giving your name and address, age, call (or grade of license held) and college degree received. We are centralizing the collecting of names and you will then hear directly from the Navy in short order.

MARITIME OPERATORS

WE BRIEFLY call attention here to the swell opportunity described at length in our special article on the Maritime Commission's school for radio operators run by the Coast Guard. Here is an invaluable training course in commercial operating, available without enlistment or commitment to qualified high-school graduates between 18 and 23 years of age who have about Class B qualifications—and free, with everything found. See the article for details.

ATTENTION, O.R.C.

THE Signal Corps needs several thousand additional officers of company grade. Reserve officers of other arms and services who are graduate electrical engineers, or who have had Signal Corps experience or training, may arrange through their Corps Area or Department com-

mander for duty with or transfer to the Signal Corps, with extended active duty immediately available.

About the first of July the Signal Corps will establish an officers' training camp at Fort Monmouth. Regular Army enlisted men and draftees of six months or more experience, who are under 36 and have the necessary qualifications, will be eligible for this course, which yields a lieutenancy.

AIR CORPS COMMUNICATIONS

THE Army Air Corps wants squadron communications officers—who have charge of the operation and maintenance of squadron radio equipment and general supervision of local communication; ground duty only. There is an instruction course of about nine months in the status of cadet: 16 weeks of specialized study at Scott Field, Belleville, Ill., followed by 5 or 6 months of practical experience, terminating in commission as 2d Lieutenant, Air Reserve, and active duty for up to three years. Status in training same as flying cadets: \$75 a month, uniforms, quarters, subsistence. Candidates must be unmarried citizens, 20 to 26; physical requirements less rigid than for flying, but must meet ORC standards. Preference is given EE and other engineering graduates but currently-licensed amateurs, who have successfully completed two years of college work, will be considered. The course offers good practical radio training. A 2d lieutenant receives base pay of \$125 plus \$18 subsistence, plus \$40 rental allowance when living off a post. Address all applications and inquiries direct to Office of the Chief of the Air Corps, Washington.

C.C.C. AND N.Y.A. INSTRUCTORSHIPS

CCC's large-scale training plans still await Congressional appropriations. Many amateurs have registered for employment as instructors—probably enough to fill the needs. As quickly as funds are available, CCC will communicate with the successful applicants already registered.

NYA provides work-experience by building radio equipment for public agencies such as police and forestry departments and schools. Administration is decentralized, each state having its administrator to plan work and engage personnel. Many states need radio instructors and supervisors at salaries around \$1800, and some state radio engineers at higher salary. Applicants must be over 25, possess Class A amateur and

either radiotelephone first or radiotelegraph second licenses, and have had experience in commercial operating or manufacture. NYA youth also receive code and theory under auspices of Office of Education, through state vocational education boards, and frequently radio supervisors are engaged jointly by NYA and OE. Contact the State NYA Administrator, or write for his address and blanks to R. R. Burton, NYA Radio Engineer, 2145 C St., N.W., Washington, D. C.

NAVY RADIO OPERATORS

RECRUITING has been resumed in Class V-3 of the USNR. Young men, who desire to enlist for training as Navy radiomen, may apply at the nearest Navy recruiting station. Instructions have been issued to give preference to applicants holding FCC operator licenses. Successful applicants will be given a short period of instruction at a Naval Training Station and then sent to a Naval Reserve Radio School for a 16-weeks' course in radio, to be followed by active duty afloat or ashore. Those particularly well qualified physically and who have aptitude for aviation communication may be given further training to qualify as "qualair" radiomen. All information from your local recruiting station.

REGISTER WITH A.R.R.L.

ARRL is bringing many individual amateurs in contact with agencies needing personnel for engineering and radio operating—industrial as well as Service work. In February *QST*, page 25, we published a blank form whereby amateurs who wish to be considered for such

positions may register their availability at headquarters. The form also deals with the availability of your station facilities for defense work that amateurs may be called upon to perform. Of equal importance is the fact that, through this mechanism, amateurs may be helped to better positions; and those already employed in satisfactory positions in nonessential industries may be made available to endeavors of greater current importance. For these several reasons we urge the filling out of the form (or a reasonable facsimile) by those who have not yet done so. See February *QST* and register with ARRL.

Gallups Island

(Continued from page 12)

is the guinea pig group — the boys all came from the CCC and were "picked out of the trees." They are coming out in June as 2nd class commercial ops after going in without regard to qualifications. If they can do it, and like it, we can imagine that this will be heaven to any ham who wants to follow radio as a career. *For complete information on the school at G. I. address a note to Chief, U. S. Maritime Service, U. S. Coast Guard Headquarters, Washington, D. C.*

Earl Burns and his co-workers rate great credit for the grand job they have accomplished. It seems that everything has been done and no expense spared to create a comfortable, pleasant atmosphere for the boys. When we tell you about the glass top operating desks with green felt underneath, we think you will understand what we mean! Many kinks were picked up from this trip and we expect to benefit by passing them along to the rest of the gang at our Hq. lab. (And we are mentally including a couple of those positively plutocratic lab stools we saw for the first time. Boy, how we could turn out the gear perched on one of those!)

We were just able to wind up and shove off on the last boat at 4 p.m. When the dog days get us down at La Salle Rd. this summer we'll think of those boys out there in Boston harbor with a nice sea breeze fanning their studious brows. We suggested it as an ideal spot for a hamfest and were told it might be arranged.

Everyone treated us royally — no request of ours, however annoying, was refused — whether it was breaking into an examination and getting students and instructors to fit into photos or up on the parade grounds when we experimented for an hour with 300 men going into various formations to see which suited our photographic purposes best. (It's just possible those boys didn't appreciate seeing us as much as we did them!) Regardless, we are certain of one thing — they will be a credit to Uncle Sam when they are standing watch aboard any ship.

— C. C. R.

SIGNAL CORPS COMMISSIONS!

Word just reaches us of an interesting new opportunity for graduate electrical engineers and electron physicists, aged 21 to 36, unmarried and without dependents. The Signal Corps wants them for immediate commission as 2nd Lieutenants for *special work*; active duty for one year and the option of extending to two. Draftees already selected and in Army camps are eligible — we believe this the only opportunity in the Army for a man subject to the draft to be commissioned. Details next *QST* but watch your daily paper and WIAW's broadcasts. Signal Corps officers will visit major cities to interview candidates. If interested, write at once to G. W. Bailey (WIKH), Academy of Sciences, 2102 Constitution Ave., Washington, or Office of the Chief Signal Officer, Washington.

• For the Junior Constructor —

A Fool-Proof Rig for 80 and 40 Meters

A Two-Stage Low-Power Outfit for the Beginner

IN DESIGNING a transmitter for the beginner, there are three factors which one must attempt to keep in balance. These are cost, simplicity in construction and ease in adjustment and operation. A review of some of our own work in the past shows that it has been all too easy to give disproportionate weight to one of these factors, thereby to a great extent destroying the balance for which we have been striving.

Invariably, the factor which is made to suffer most is that of ease of adjustment and reliability of operation. Yet careful consideration would indicate that this factor should be most important of all to the beginner who is immediately in a quandary when some slight liberty in circuit value or adjustment, innocently taken, results in spoiling the performance of the transmitter. Failures whose sources are promptly recognized by the more experienced usually result in discouragement to the beginner who labels the circuit "N.G." and tries his original parts in another circuit with still poorer results. While cost is an important factor, it is readily possible to carry it to extremes. The saving of a dollar or two, often amounting to only ten per cent or less of the total cost of the transmitter, is really of little importance, especially if extreme economy results in tricky adjustments or complicates construction.

The usual beginner's transmitter is built around a single tube, following the premise that more than one stage will make the first step too complicated or too expensive. The frequent result is a transmitter whose coupling to the antenna circuit is critical in adjustment for a compromise between maximum output and reliable, chirp-free keying. To make matters worse, an attempt is usually made to make up for the lack of additional power stages by running the oscillator at high-power input, incurring the danger of crystal fracture as well. Almost everyone who has had experience with high-power oscillators eventually comes around to the oft-voiced conclusion that most troubles will be avoided if the oscillator, be

it crystal controlled or self-controlled, is treated as a frequency-control unit with power output of decidedly secondary importance.

Most of the prejudice toward a two-stage transmitter for the beginner could be eliminated if a simple and reliable amplifier arrangement could be found. The usual triode amplifier circuit is complicated in both construction and adjustment by the necessity for neutralizing circuits to prevent self-oscillation. On the other hand, the unneutralized screen-grid amplifier requires careful placement of parts and shielding at appropriate points. This often results in even more complication than that of the neutralized triode amplifier.

There is one well-known amplifier circuit, however, which has been sadly neglected, although practice has shown it to be one of the best so far as simplicity and reliability of operation is concerned. This is the inverted amplifier¹ in which excitation is fed to the amplifier between the cathode and ground rather than between grid and ground. In a circuit of this type, feedback through the plate-cathode capacity (which corresponds to the plate-grid capacity in the usual amplifier arrangement) is *degenerative* rather than regenerative and this accounts for the unusually stable operation of the amplifier under all conditions. In fact, experience with the transmitter shown in the photographs has indicated that it is practically impossible to make the amplifier oscillate when using a tube such as the 6L6.

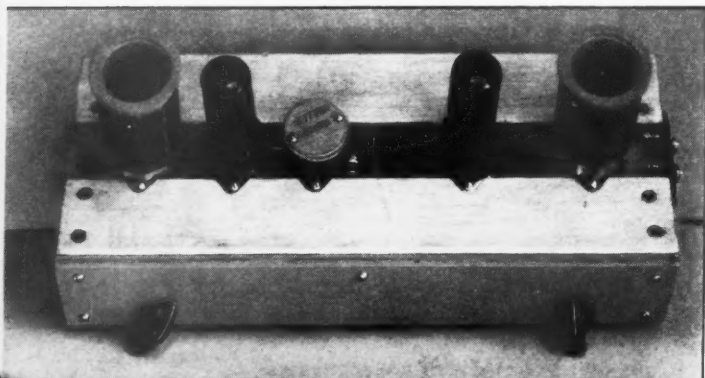
Of course, a degenerative amplifier requires greater driving power than normal for the tube in the usual arrangement. But since the required driving power is easily obtained with the normal oscillator complement, a somewhat greater driving-power requirement is of no consequence.

¹ Romander, "The Inverted Ultraudion Amplifier," *QST*, Sept., 1933.

Austin, "Type 59 Tube as Inverted Amplifier," *QST*, June, 1935, p. 42.

Austin, "A Different Portable-Emergency-Transmitter," *QST*, July, 1940.

The completed beginner's transmitter. From left to right, the sockets are: 5-prong for the oscillator plate tank coil, octal for the oscillator tube, 6-prong for the crystal (three prongs wired together on each side), octal for the amplifier tube and 5-prong for the amplifier plate tank coil.



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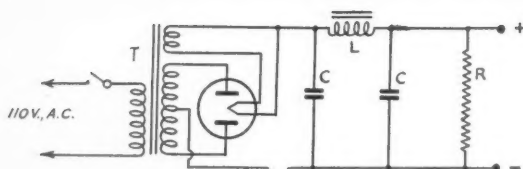


Fig. 2 — Suggested power-supply circuit for the beginner's transmitter.

C — Two 8- μ fd., 450-volt working electrolytic condensers in series.

L — 10-henry, 150-ma. filter choke.

T — Broadcast replacement transformer, 400 volts each side of center, 150-ma. d.c., with 6.3-volt and 5-volt filament windings (UTC S-39 — use low-voltage secondary taps on high-voltage secondary).

Rectifier tube — Type 83.

No. 14 bare bus wire is fastened along the rear strip to serve as a grounding wire. The ungrounded sides of the heater and coupling circuits are run close alongside the grounding wire with insulated push-back wire. Other connections are made directly from point to point with by-pass condensers connecting directly between the points to be by-passed and the ground wire.

Power Supply

Of course, the power output obtainable from the unit will depend to a great extent upon the plate voltage used. The transmitter has been tested thoroughly at a plate voltage of 450 for periods of 15 to 20 minutes with the key closed continuously with no sign of crystal heating nor of creeping in plate current, even when the amplifier was running at power inputs as high as 60 watts. Operation of the 6L6 as a triode, rather than as a tetrode apparently eliminates this trouble which is often experienced with the tetrode arrangement when an attempt is made to operate the amplifier at high input.

Fig. 2 shows the diagram of a simple power supply using a condenser-input filter. Any of the cheaper transformers designed for broadcast-receiver replacement service will be satisfactory, but if one is not already at hand, one delivering 400 to 440 volts each side of center with a current rating of 130 to 150 ma. will be about optimum for maximum power output and its cost will be but slightly above the lower-voltage types. Plate voltage in excess of 450 is not recommended.

Tuning

Before tuning, a careful check of wiring should be made. In connecting up the unit, the key should be connected between the two terminals marked *K* in Fig. 1. The two 6.3-volt heater leads should be connected to the terminals marked *F*. Negative high voltage will be connected to the terminal marked *-B* (common with one side of the heater and key). Separate terminals are provided for the positive high-voltage connec-

tions so that individual meters or other resonance indicators may be connected in each lead. If standard-type meters are not available, cheaper meters will do almost as well, since their chief function will be that of indicating resonances. In fact, a single meter may be used and placed permanently in the amplifier lead after one has become accustomed to the operation of the oscillator. A separate meter for the oscillator should have a scale of 0 to 150 ma., while the one for the amplifier, or for use in checking both stages, should have a scale of 0 to 200 ma. In case even cheap meters are deemed too expensive, dial lamps may be pressed into service. The 150-ma. type (No. 40 tan bead) may be used for the oscillator and the 250-ma. type (No. 46 blue bead) for the amplifier.²

In connecting the meters, or other indicators, a wire from the positive high-voltage terminal of the power supply is connected to the positive side of the oscillator meter, while the other side of the meter connects to the terminal marked *+B OSC*. A second wire from the positive terminal of the power supply goes through the amplifier meter in a similar manner to the terminal marked *+B AMP*. In case only a single meter is used, it is connected in one of the two previously-mentioned leads, while the second lead from the power supply goes directly to the transmitter terminal.

The 3.5-Mc. coil should be placed in the amplifier for initial tests. With the power supply turned on, allow about 30 seconds for the heaters to come up to temperature, while setting both condensers at maximum capacity, and then close the key. The oscillator should show high plate current, while the amplifier should draw but a few milliamperes. Tune the oscillator tank condenser *C*₁ until there is a sharp dip in plate current indicating oscillation. At the same time, the amplifier plate current should rise to a high value. Tune *C*₁ to produce maximum dip in oscillator plate current and then adjust *C*₂ for maximum dip in amplifier plate current. A check will show that the oscillator will cease functioning whenever *C*₁ is adjusted somewhat to the high-capacity side of resonance. *C*₁ should be adjusted to a point as close to the maximum-dip point as possible but sufficiently far on the low-capacity side to allow reliable keying. The transmitter is now tuned up for 3.5-Mc. output.

Now swing *C*₁ to a point near minimum capacity where another dip in plate current will be found. This will be accomplished by high amplifier plate current. The amplifier tank condenser, *C*₂, may then be tuned to a point near minimum capacity where a second dip in amplifier plate current will now be found. The transmitter is now tuned to

² For further information on the use of dial lamps as indicators see:

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the 7-Mc. band. If the 7-Mc. coil is used in the amplifier plate circuit, tuning of the transmitter will be similar except that amplifier resonance will be found at a point near maximum capacity of C_2 .

Since the oscillator continues to function at all settings of C_1 on the low capacity side of resonance at the fundamental, no cessation of oscillation will be encountered when working at the second harmonic of the crystal and the oscillator tank circuit may be tuned to the exact point of minimum plate current. As a word of warning, a crystal ground to a frequency between 3500 and 3650 kc. should be used to work both the 3.5- and 7-Mc. bands. Crystals of frequencies higher than 3650 kc. may be used for 3.5-Mc. work only, since their second harmonics fall outside the 7-Mc. band.

Antenna

This transmitter will, of course, work with any of the various antenna systems in general use designed for 3.5- and 7-Mc. operation. A very good type is an antenna 136 feet long, with tuned feeders 67 feet long at the center. With these dimensions, parallel antenna tuning will be used on all bands. The antenna tuner should consist of a small-type 330- μ fd. variable condenser (or an old b.c. receiver tuning condenser) in parallel with a coil consisting of 13 or 14 turns of No. 18 wire spaced to occupy a length of $1\frac{1}{2}$ inch on a $1\frac{1}{2}$ -inch-diameter form for the 3.5-Mc. band. For the 7-Mc. band, the coil should have about 8 turns of the same diameter and length. The form should be fitted with a link winding of a few turns wound at the center of the antenna-coil winding.

With the feeders connected across the antenna-tuner condenser terminals and the link on the antenna tuner connected to the link on the amplifier coil by a pair of closely-spaced wires, tuning the antenna tank circuit to resonance should cause an increase in plate current to the amplifier. Plate current will be maximum when the antenna circuit is tuned to resonance. The number of turns in each link winding should be adjusted until the amplifier draws a maximum of about 100 ma. as the antenna is tuned through resonance when the amplifier is operated at 450 volts. At 350 volts, the maximum plate current should be limited to about 75 ma. as optimum loading. Make sure that tuning of the antenna circuit has not disturbed the tuning of the amplifier tank circuit by a final retuning of the amplifier tank circuit to maximum current dip. As the loading is increased, the dip will become less pronounced.

Since it is difficult to give exact figures for antenna-coil dimensions, it may be found necessary to add or subtract a turn or two from the number suggested above. The idea is first to get the antenna circuit tuning to resonance by ad-

justing the coil and condenser and then adjust the links for proper loading.

After the antenna-coupling links have been adjusted the following procedure should be followed: First tune the oscillator tank to resonance, then, *with the antenna condenser set at minimum capacity*, tune the amplifier tank circuit to resonance. The third step is that of swinging the antenna tuning condenser up to the point which gives maximum amplifier plate current. By following this procedure it will usually be found that the tuning of the amplifier has not been disturbed. This should be verified by retuning the amplifier tank circuit slightly to make sure that it is still at the point of plate-current dip.

It may have been noticed that no actual figures of currents have been given in the foregoing instructions in tuning. The reason for this is that exact values will depend upon the plate voltage used. The following values, taken at two specific plate voltages, may be used as guides, however. At 350 volts, the oscillator plate current at resonance should run about 25 to 35 ma., the amplifier minimum plate current with no load at 20 ma. with the large plate coil and 25 ma. with the 7-Mc. coil, and grid current to the amplifier 40 ma. on either band. With the final loaded to 75 ma., the output on either band should be 10 to 12 watts.

At 450 volts, the oscillator plate current at resonance should run 30 to 40 ma. (the higher value when operating at 7 Mc.), the amplifier minimum plate current without load 25 ma. with the large coil and 35 with the 7-Mc. coil, grid current 55 ma. With the amplifier loaded to 100 ma., the output on either band should be between 20 and 25 watts. Oscillator screen voltage will remain practically constant at 250 volts with the transmitter in operation at either plate voltage.

The adjustment of the antenna coupling and tuning system will be the most difficult part of the job of getting the transmitter built and on the air. Once this difficulty has been bridged, we think that you will agree that its smoothness of operation and reliability is just about all that could be asked for.

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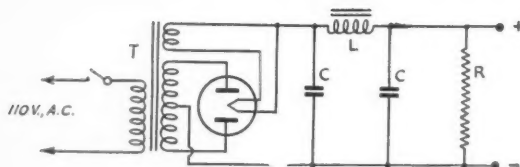


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— D. H. M.



Improving the Transmitting Loop

Side Loading for Increased Radiating Properties

BY JAMES H. GREEN, JR.,* W8MYW

ALMOST since the inception of radio transmission the notion of using loop antennas for the propagation of radio waves has appealed to a goodly number of the amateur fraternity. The convenient physical form and the marked

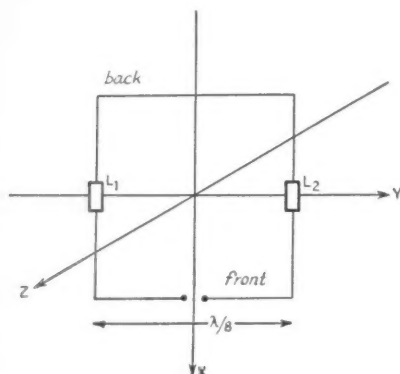


Fig. 1 — The loop circuit with side loading. L_1 and L_2 are the loading coils, described in the text.

directional properties of the loop are assets greatly to be desired in an antenna for use with a portable transmitter for the five- or ten-meter bands, or even for home locations where space is limited and it is impracticable to erect the large, cumbersome framework needed for the common type of array. The attractiveness of this type of radiator was further enhanced when, in 1939, J. L. Reinartz¹ described a loop antenna with a definite unidirectional pattern, a unidirectivity not predicted by the existing theory and still without a complete mathematical analysis.

One very serious drawback, however, prevented any very general use of these loops. Their overall efficiency was very low. Even the loop developed by Reinartz, while almost infinitely superior to anything that had been introduced to the amateur previously, still failed to produce an overall gain quite equal to that of a simple dipole.

However, recent developments chiefly due to E. M. Williams have produced a loop which has a gain of about 1.4 decibels over a simple dipole, thus removing this last and very formidable objection to the use of frame aeriels. Perhaps those

of you who have been wondering how you could get that five- or six-element beam into the space allotted to you by the family may find your answer in the description which follows, for these loops may be combined in much the same fashion as simple dipoles to form multi-element beams.

In attacking the problem of how to increase the efficiency of the loop antenna for transmitting Williams² started by recognizing the fact that for maximum radiation in any given direction it was necessary to construct, if possible, a loop with current maxima on the two sides perpendicular to the direction in which the greatest radiation was desired. With reference to Fig. 1, in which the loop is diagrammed, this means that if we are

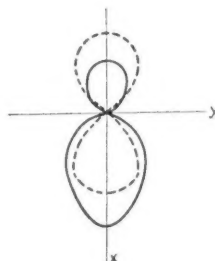


Fig. 2 — Field strength patterns of loop (solid line) and dipole (dotted line). In the optimum direction the loop field strength is 1.4 db higher than that of the dipole.

to have maximum radiation in the X direction current loops must appear on the sides marked "front" and "back." The greatest radiation actually will occur off the front or open side, while a minor lobe will be found off the back. This is shown in Fig. 2 which gives the directional pattern of the loop as compared to that of a simple dipole, and will be discussed in more detail later on.

Transmission line theory predicts that this desired distribution of current is that existing in a half-wave transmission line. We may assume, therefore, that by loading the loop with inductances of the proper value a condition electrically similar to that existing in the half-wave transmission line could be obtained with a loop having a periphery much smaller than one wavelength.

Williams tried this with a loop one eighth of

* 1593 Yale Station, New Haven, Conn.

¹ J. L. Reinartz, "Half Wave Loop Antennas," *QST*, vol. 21, pp. 27-29, Oct., 1939.

² E. M. Williams, "Radiating Characteristics of Short Wave Loop Aeriels," *Proc. I. R. E.*, vol. 28, No. 10, pp. 480-484, Oct., 1940.

a wavelength square and found that the desired current distribution was obtained with a loading coil of 180 ohms reactance placed in the middle of the back of the loop.

This loading also produced the optimum time-phase relationship between front and back for unidirectional X radiation, according to the transmission line theory being used. It might be well to point out here that the use of transmission line theory in the study of this particular problem is scarcely justifiable if one is attempting a rigorous mathematical analysis. Here, however, no such attempt is being made. The theory is being used only as an aid to good guessing as to what line of attack to follow in the experimental investigation of the problem.

Side Loading

Perhaps because of this inadequacy of the transmission line theory a completely unidirectional pattern was not obtained from the loop described above. The suggestion was made by Williams that perhaps some other arrangement of loading coils would produce a completely uni-

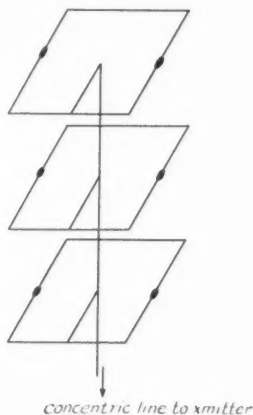
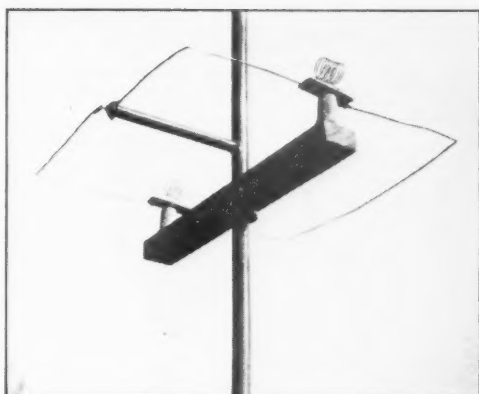


Fig. 3 — The three-loop array for increased gain and directivity. A 50-ohm concentric line is used for feeding the loops.

directional loop. Working on this suggestion we tried all possible locations of one and two loading coils and found that none of these produced the desired results. One, however, was found which

By appropriate loading of a loop having sides of the order of one-eighth wavelength long, radiation in the optimum direction greater than that from a conventional doublet can be secured. Thus compactness and directivity can be obtained without sacrifice of transmitting range.



A close-up of one of the loops. The loading coils in the sides are clearly visible in this photograph, as is also the spur feeder of concentric line.

was considerably better than the others tried. This one, shown in Fig. 1, is realized when one loading coil is placed in the center of each side. The pattern of this arrangement is not completely unidirectional but the overall gain is slightly better than that of any other arrangement. This presumably is because the loading coils are placed at points which are current nodes, not loops, leaving the current maxima along straight pieces of wire. These loading coils, L_1 and L_2 on the diagram, should have a reactance of slightly more than 360 ohms. It is found to be advisable to insert coils of approximately the right size (10 turns, 1 inch in diameter, spaced to occupy 4 inches, for 112 Mc.) and to tune for maximum

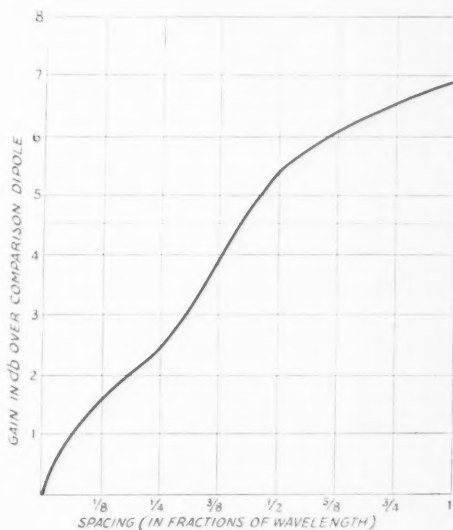
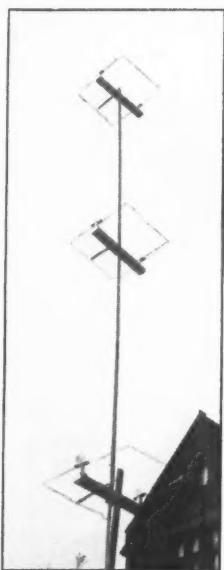


Fig. 4 — Measured gain over dipole for two loops at various center-to-center spacings, fed in phase. Planes of loops are parallel.



A three-loop array for 112 Mc. The concentric feed line is the vertical support.

radiation.³ This precaution is advisable inasmuch as the reactance of the loop itself changes somewhat depending upon the size of wire used and other indeterminate factors. The tuning may be easily accomplished by shorting turns until maximum reading is obtained on a field strength meter or on an r.f. current meter inserted in series with the loop at the junction with the transmission line.

For the purpose of determining the proper type of transmission line to use with the loop an accurate measurement of the impedance of the loop was made. It was found to be very low — approximately 50 ohms — so that the loop may be fed from a twisted

pair or, preferably, a concentric line.⁴

One of the few faults to be found with the an-

tenna is that a fairly high component of its radiation is in the Z direction. This fault can be corrected, it is found, if two or more of the loops are placed side by side (common Z axis) at a spacing of one-half wavelength.⁵

In the model in use at W8MYW/1 a concentric line coincident with the Z axis of the loops feeds three such loops through short spurs which run from the main feed line to the loop terminals (see Fig. 3). Tests indicate that arrays made up in this way are equally good in directive properties and overall gain as a broadside array of simple dipoles and are in addition more compact and easily managed.

³ The inductance of a coil having a reactance of 360 ohms is equal to 57.3/f; if *f* is in megacycles the inductance will be in microhenrys. A coil of the required inductance can be constructed with aid of the *Lightning Radio Calculator*, or from the *Handbook* formula

$$N = \sqrt{\frac{3A + 9B}{0.2A^2}} \cdot L$$

where *N* is the number of turns, *A* the coil diameter, *B* the length of the winding, and *L* the inductance in microhenrys. — Ed.

⁴ The method by which this measurement was made, which may be of some interest to the advanced amateur who is faced with the problem of making measurements at ultra-high frequencies, is described by Lewi Tonks in *Physics*, June, 1932, pp. 1-11.

⁵ Close spacing is also possible, loops being spaced 1/10 of a wavelength. This is advisable when more than four elements are to be used.

June 7th—8th—Ninth A.R.R.L. Field Day!

Test Self-Powered Emergency Rigs Afield—Arrange Outings, Report Results for QST—Don't Miss Radio Opportunity in the Field Day

CLUBS are all invited to encourage their members to build portables and to arrange special Field Day activities. Every amateur is invited to take part, whether or not able to participate in club plans. Join a group or get up a group to get maximum fun and profit from FD opportunities. Test equipment in the Field Day. Ask for application forms for registering equipment and availability in ARRL's Emergency Corps, if you do not already hold a membership card in this organization. Plan for an outing. Make testing of self-powered stations in actual operation the watchword. In making FCC notification¹ refer to Order No. 73-D which authorizes properly notified operation of portable amateur stations participating specifically in the ARRL Field Day Tests for the period of that test.

No amateur station should be regarded as

¹ To comply with FCC regulations for portable station operation, licensees must make advance notification of the location in which the portable will be operated, to the Inspector-in-Charge of the district, and use proper station identification (DN 1-2, etc.) unless work is confined to 28-Mc., 56-Mc. and higher frequency amateur bands.

complete without *some* measure of self-powered equipment. Get set in however modest a way for such contingency. Take part in the FD; it's often a revelation what 20 or 25 watts can do! The annual FD is dedicated to testing in actual operation, independently powered station equipment. *To be prepared for communications emergencies* requires advance readiness on the part of every amateur. The operator must have the equipment, know how to set up quickly for efficient operation, know how to formulate and handle messages (proper order of parts, check, receipting for responsibility, recording of handling data), know how to tune up workable ready-cut antennas in new locations, how to make the most of low power, and many other things. Operator experience is as essential as the equipment.

Operation: The aim for each field-portable is to work as many other amateur stations as possible (either home or afield) in the time allotted. Report your FD location and circumstances by radio message to ARRL. Advance entry is not required. All participating will use

the call (c.w.) CQ FD or ('phone) CALLING ANY FIELD DAY STATION. Mobile work does not count. It is a test of portables. Manufactured contacts with any station or stations of members of the same field group in the contest do not count. Any or all amateur frequency bands may be used.

Portable stations operated in the field (away from "home" address) are eligible to submit field scores. Only portable set-ups may be listed with FD classification. Individuals or groups under one call must be "in the same locality," "in one group or building or field" constituting a single FCC-notified¹ location. To have points count, all station control points at a FD station must be within 500 horizontal feet of some given point.

The Operating Period: Operating time for the FD shown in logs must be between Saturday, June 7th (4 P.M. EST, 3 P.M. CST, 2 P.M. MST, 1 P.M. PST), and Sunday, June 8th (6 P.M. EST, etc.).

Note that the specification of time has been changed from 4 P.M. LOCAL time this year so that all stations open at the standard time specified for their area, time in all instances corresponding exactly to that specified in the F.C.C. Order No. 73-D to make our Field Day successful.

FD Scoring: Each non-portable amateur station worked counts *one point* toward the score. Portable-to-portable contacts will count *two points*. The same station contacted again counts again *only* if the FD transmitter credit reported was on a different amateur frequency band, as for example, a contact when using 3.5-Mc. c.w., followed by one with the FD set up on 3.9-Mc. 'phone, on 7-Mc. c.w., etc. An extra credit of 25 points² before multiplier may be claimed for radio origination of not more than one message addressed to ARRL Hq., *provided only* message copy is submitted with claimed score. FD Messages to Hq. all will include the following data: Number of operators, location, conditions, power. One additional point (also before multiplier) may be claimed for radio handling of each FD message of another group if copy showing full handling data is submitted with station list and claimed score ($\frac{1}{2}$ point for receiving and $\frac{1}{2}$ point for radio relay transmission).

Multipliers: Score may be multiplied by 2 if either the receiver or transmitter is independent of mains or commercial power source, by 3 if both transmitter and receiver are supplied from an independent local source or sources. The following additional score multiplier is determined by the power input to the final stage (plate voltage times plate current):

- (a) Up to and including 30 watts — multiply score by 3.

² 10 points will be deducted from the possible 25 for incorrect check, failure to show full handling data, improper order of sending preambles, or other defects or variance from standard ARRL procedure. Word count for correct checking is explained in *The Radio Amateur's Handbook*, Chapter 31, page 432. (Change example 6YA2 to read 4 words.)

HOME STATIONS

Home stations are invited to list all their contacts with FD stations in the above period, sending these in for a separate score listing — to show what they can do — and to encourage the cause of amateur preparedness even if they are personally unable to join a FD group as yet. Home station scores will be THE NUMBER OF FD PORTABLES WORKED plus POINTS FOR FD MSGS HANDLED (1 ea. rec'd if copy mailed Hq.) (2 for relays; 1 when rec'd, 1 when sent forward). Stations claimed must be listed with the time worked, and message credits must be substantiated by copies of the messages, with full handling data.

- (b) Over 30, and up to 100 watts — multiply score by 2.

- (c) Over 100 watts — multiply score by 1.

Entries for stations located in the Northwestern, Pacific, Rocky Mountain, Southwestern, and West Gulf Divisions may have the score computed as above described multiplied by a final multiplier of 1.5 to assist in equalizing contact opportunity for Field Day set ups in the less populous areas.

Reporting: Score claims must be shown as the sum of points for each set-up. A station-worked list for each band must show contact times for each contact. A statement covering on-off times for bands and transmitters is required. State the maximum number of transmitting units in simultaneous operation at any time. Attach copies of all messages for which any credit is expected, just as handled and with time and stations indicated. Note the source(s) of plate and filament power, along with the "watts input" for each rig. All reports to count must be mailed on or before July 11, 1941, to constitute an entry.

In the event of any doubtful points the interpretation and evaluation by the rules committee on the matter in question will be final. For the purpose of QST listings groupings of participating stations will be based on the maximum number of

(Continued on page 76)





IN THE roster of League directors we find many actively contributing to the national defense. Lt. "Brad" Martin, 3QV, is on active duty at the Philadelphia Navy Yard. Robert Kirkman, 2DSY, is doing civilian research work for the Signal Corps at Ft. Monmouth. Raleigh (N. C.) State College will have to get along for a while without Capt. H. L. Caveness, 4DW, now military representative on a selective service board. Lt. (jg) G. L. Dosland, 9TSN, has forsaken his law practice to instruct at the Navy's Indianapolis radio school. Ens. W. A. Green, 5BKH, has just been called to active duty. Fred Young, 9MZN, has a year's leave from teaching to inspect ground schools of the CAB's training program.

Radiomen on the U.S.S. *Vincennes*, down Puerto Rico way, include Casey, 1LXP; Lee, 1HRJ; Eberhardt, 9FTJ; Galambos, 3EPQ; Cermak, 2JSB; Bartosik, SQCR; Borchert, 9PPY; Coulombe, 1MVG; Weigand, 9LHY; Lewis, 5BNS; Oehmer, 1LQD; Jewett, 2MGD, and Muhlbach, 2IUH. RM1c Brand, 8NTQ, and CRM Thompson, 91NX, operate under Lt. (jg) McAllister, 8HKT, aboard the *Dubuque*. Ens. Jones, 5BRQ, supervises a communications watch on the *Oklahoma*. Former Director Glasscock, 9FA, reports Colorado Naval Reservists on active duty as follows: Fairfield, 9REU; McClelland, 9DSD; Haase, 9GLI; Samuel, 9SBB; Fearn, 9TEJ; Coleman, 9TSQ; Parks, 9MTE; Hooper, 9BY Y; Richards, 9KSE; Miller, 9WTW, and Lt. (jg) Shields, 9PWO.

Ens. Wicks, 1IZO, is an instructor at the Annapolis Naval Academy, while his former reserve superior, Lt. Young, 1CAB, handles communications for the *Kaskaskia*. OMs Edwards,

6RDQ, and Munsell, 6PCP, are "strikers" (apprentice radiomen) aboard the Coast Guard's *Itasca*. Chicago is well represented on the *Sacramento*, with CRM Janiga, 9HPQ, RM1c Nameny, 9FZH, and S1c Varga, 9WIB, handling communications assignments. RM1c Storms, 4EIA, and Baker, 4FIL, monitor from the Navy's DF station at Jupiter, Fla. Seamen Larson, 9UJG, and Winkleman, 7HCW, are learning Navy ropes at San Diego and Los Angeles, respectively. San Francisco's SCM Hughes, 6CIS, is RM1c on active duty at Long Beach. NPG's (S. F.) operating crew includes Radiomen Powell, 6OEI, Rose, 6DNU, and Nelson, 6QGN. RM1c Nagata, 2EGI, is teaching procedure to Navy recruits at Floyd Bennett Air Base, and Lt. (jg) Harry Tummonds, 8BAH, former Ohio SCM, is ditto at Great Lakes, Ill.

When the New York National Guard (27th Div.) was called into service at Ft. McClellan (Ala.) last winter, it included Lt. Pritchard, 2IHM, as communications officer, and Sgt. Nerf, 2NHP, and Pvt. Robinson, 2KPH, as radio operators. Cpl. Brands, 9YTV, pounds brass at the post radio station, Ft. Sheridan (Ill.). Supply Inspector Coan, 2AUQ, makes certain the Signal Corps at Ft. Monmouth gets its money's worth. One of Ft. Bragg's (N. C.) Army Net watches is assigned to P1c Hawn, 4HBT. Sgt. McClain gave up 4FCB to become K6SZH and an air mechanic at Wheeler Field, Hawaii. More Camp Shelbyites are Radio Sgt. Bennett, 9EUP, Pvt. Babb, 8OIL, Lt. Schwenn, 8CGN, and Staff Sgt. Richie, 9TKV.

Capt. Newman, 7YG-GPZ, is liaison officer for the Ninth C.A., AARS. Former QSL Manager Melvin, K5AP-W4FBD, is an Air Corporal at Albrook Field, C. Z. Signal Corps 1st Lts. include Peck, 3CND, at Fort Knox; Janes, 9KS, at Ft. Des Moines; and Blencoe, 9ESM, at Camp McCoy (Wis.). Lt. Buckalew, SASW, finds AARS experience helpful in his present duties at Ft. George Meade (Md.). In the 36th Signal Co. at Camp Bowie (Tex.) we find Lts. Nemie, 5GYA, and Wells, 5HRV; Staff Sgt. Aldridge, 5GWF; Cpl. Cannon, 5IMB; and Privts. Richardson, 5EWK, Chewing, 5IOE, Bowers, 5EWZ, and Riggs, 5JM.

In the Lieutenant-Colonel department: Davis Boyden, 1SL, was recently made division signal officer of the Massachusetts State Guard. League Asst. Director W. A. Beasley, 9FRC, is with the 35th Division at Camp Robinson (Ark.). Down at Camp Shelby we find Cleveland's SAV, Robert C. Bohannon, with an eye out for Ohio

SERVICE RECORDS WANTED

We are compiling data on the participation of radio amateurs in defense work, and want the following information from all amateurs serving in radio work with our military forces. A postcard will do the job:

- (1) Are you a Selective Service conscript, a volunteer, or a reservist on active duty?
- (2) For how long a term are you serving?
- (3) Is your service in the Army, Navy or the Marine Corps?
- (4) To what outfit or organization are you assigned?
- (5) Location; where is your organization stationed?
- (6) What rank or rating do you hold?
- (7) What is your present radio duty assignment?
- (8) Were you previously a member of NCR or AARS?
- (9) Give your name and your home call.

amateurs "caught in the draft" so he can get them assigned to his section of the Signal Corps. Then there are Lt. Cols. Calvin Burkhead, K4GTH, of the Signal Office in San Juan, P. R.; James C. Hughes, 9BQU, at the Ft. Bragg (N. C.) replacement center; and Stanley G. Saulnier, 9DJZ, at Ft. Knox.

The newly-formed 1st radio intelligence company at Ft. Monmouth, now training its members in monitoring and direction-finding work, includes the following hams assigned duties as intercept operators: Cpl. Russell, K6SMD; first-class privates Barolet, 1KLR, Sickly, 8ROU, Priggen, 1MCJ, Bissonette, K6MAW, and privates Podolsky, 1MYP, and Bottorff, 3HTL. Plc Schoner, 8LYF, and Pvt. Getter, 1MIJ, are maintenance men. In free hours they all keep WSROU/2 and W1MCJ/2 plenty active on the air.

Out near Pearl Harbor, Hawaii, operating on the U.S.S. *Pennsylvania*, are RM1c Lundmark, 9MGS, RM1c Hallet, 6OSX, and RM2c Ryburn, 8RGK. Among the crew at NAD, Boston Navy Yard, are Lt. Story, as communications officer, and CRM Paounoff, 1EOB — the latter of Massachusetts AARS fame. RM3c Knickerbocker, 8RZP, and Sims, 8RZZ, are operating buddies on the *Philadelphia*, out Hawaii way. One of the yachts converted by the Navy for patrol work is the *PC509*, on which Radiomen Meyrowitz, 2EVO, Goldberg, 2IEK, and Szafranski, 1AFG, handle communications assignments. Ens. Atchley, 1HKK, is taking further d.f. training at Charlestown (Mass.) Navy Yard. RM3c Haire, 1LLY, and Leonard, 1DIJ, operate on the *St. Louis*.

Cpl. Babin of the Marine Corps has finished radio school and is now en route to Cuba. RM3c Ledbetter, 9WTT, is assigned to the aircraft carrier *Enterprise*, and CRM Garmston, 6NKM, mixes observing and radio operating on her sister ship, the *Lexington*. More temporary Hawaiianites are RM1c Dmitruk, 9NUN, and Mitchell, 9THE, aboard the *Detroit*. OMS Roberts, 5DRQ, and Minton, 5FUE, are buddies from Dallas at the Navy's Charleston (S. C.) school. RM1c Baddorf, 3FZO, operates at the Cape May (N. J.) air base, and RM2c Maciejko, 1GVV, is stationed at Connecticut's Meriden airport. RM2c Hoffman, 9YLE, prepares for a trip to Panama operating aboard the *YP26*. RM3c Hunter, 2MAB, finds amateur past experience invaluable aboard the *Texas*. CRM Jenkins, 8GWY, reports his unit has sent RM2c Gilchrist, 8JJJ, and RM3c Giroux, 8MPN, to active duty.

Hams at Ft. Dix (N. J.) in the 174th Inf. are Tech. Sgt. Erickson, 8QLJ; Staff Sgts. Howe, 8SZK, Vaccarelli, 8UQJ; and Ortnier, 8PSO; Sgt. Reich, 8RTC; and Cpl. Boss, 8TZC. All have radio duties, and many were previously AARS members. Dr. McArthur, 4FCW, is contributing

his bit with a medical detachment at Ft. Jackson (S. C.), where also is Staff Sgt. Beeler, 4FUI, in the radio section. At Camp Beauregard (La.) are Plc Litwin, 8UKD, and Fallis, 9BAR. Sgt. Allyn, 4EEP, former AARS member, is stationed at Camp Blanding (Fla.).

When the Naval Reserve Radio School at Los Angeles convened early this year for several months' radio and signal training, fifty-four hams were in the first class, representing sixteen states and four call areas. Our thanks to 7IIA for the following list: 6AXC, R. E. McLarney; 6CUQ, Ed Hawkins; 6DLF, A. J. Hopkins; 6FDL, Leroy T. Petersen; 6FTV, Ed Falls, Jr.; 6FVQ, N. O. Wicker, Jr.; 6HKX, Bob Spargo; 6JNU, Al Sperry; 6KRM, Roy Dunnan; 6ONG, Jack Sanders; 6ONK, Russell Smith; 6HQW, Bill Rex; 6ROI, James Chiles; 6RPW, Dave Kerr; 6STH, Glen Nish; 6TAC, Ed Follmer; 6TCA, Hobart R. Clark; 6TJF, Dale Welling; 6TJL, Bob Tatarsky; 6TLG, Dan Wachner; 7BMF, Ken Stone; 7ECI, E. Zochert; 7EPH, Thad T. Tull; 7GMH, E. J. Miller; 7GSX, Jim Hargis; 7GYQ, Pat J. Carty; 7HCW, F. S. Winkleman; 7HEK, R. A. Smith; 7HES, D. W. Lindstrom; 7HQJ, Robert Buckbee; 7IBC, Albert T. Lenny; 7IIA, Edwin H. Marvin; 8QHC, Curt Craig; 8TWL, Blaine Ringler; 8UGV, Dale Andrews; 8UMX, Don Meyer; 9ARQ, Chas. V. Crane; 9CCA, W. L. Lungstrum; 9DSF, John G. Gale; 9GRP, F. G. Soyering; 9IIY, Mike Brennan; 9IVJ, W. L. Wright; 9IYH, Don Stewart; 9JTT, D. A. Berke; 9LRW, A. T. LaPlante; 9NGU, Edw. Christensen; 9OGN, Harry Wright; 9OKG, Zeno W. Jones; 9OYA, Gwynn Lassey; 9UGN, Bob Glamm; 9VLA, George R. Mole; 9WIA, Ralph Van Natta; 9WZC, B. W. Lewis and 9ZVN, Bill Culp.

— J. H.

Strays

This gem from a letter to our Technical Information Service: "I am aware that everything published in *QST* is copyrighted, but may I build one of these sets just for my own use?"

At the Mitchell Field, L. I., Barracks T73 is directly across the street from Barracks T88. — W3FIS.

CIRCULATION STATEMENT

PUBLISHER'S STATEMENT OF CIRCULATION AS GIVEN TO STANDARD RATE AND DATA SERVICE

This is to certify that the average circulation per issue of *QST* for the six months' period July 1st to and including December 31, 1940, was as follows:

Copies sold	41,577
Copies distributed free	621
Total	42,198

K. B. Warner, Business Manager
D. H. Houghton, Circulation Manager

Subscribed to and sworn before me
on this 13th day of March, 1941
Alice V. Scanlan, Notary Public

Tube Keying

BY BYRON GOODMAN,* WIJPE

The tube keyer used to obtain the oscillograms shown on these pages. This unit is more elaborate than is necessary for most installations, and it is usually necessary to use only one or two tubes, unless a high-current circuit is being keyed. The knobs on the right-hand side control the degree of lag introduced by the keyer, the jack at the front is for the key leads, and the binding posts on the left are used to connect to the keyed circuit in the transmitter. A separate filament transformer was necessary to handle the four 45 tubes in this case, but normally a single transformer would handle both the blocking voltage and keyer tube filament requirements.



TO OBTAIN clickless keying of any transmitter, it is necessary to use a filter circuit that will slow up slightly the "make" and "break" of each character.¹ The most common system uses an inductance in series with the key lead and a capacity across the key, the values depending upon the current and voltage of the circuit. Since the filter values will not be correct for a different value of current, any filter used will be a compromise unless the keyed circuit works at the same current value for every frequency band and tuning condition, and not many transmitters are built that way. Further, changing the keying to some other circuit or transmitter will require new filter constants unless the voltage-current ratio happens to be similar.

What is needed is a gadget that can be applied to the transmitter and give the proper degree of

keying lag for many various tuning conditions without readjustment. Tube keying systems are not new, of course, having been used for years, but they present the only solution to the above problem that we know of, and this article will deal with them and their adjustment and installation.

The Principle of Tube Keying

A vacuum tube is, in effect, a variable resistance (between plate and cathode) controlled by the value of voltage on the grid. If the plate circuit is substituted for the key in a transmitter, a high value of negative voltage on the grid will prevent any current flow through the tube, and reducing the grid voltage to zero will allow current to flow and a signal to be transmitted. It is apparent that the flow of current in the plate circuit can be controlled by the way in which the grid voltage is changed, so in a tube-keying system the filter is put in the grid circuit of the keying tube or tubes. By changing the constants of the grid-circuit filter, the keying of the transmitter can be controlled. Further, the keying characteristic will not change materially no matter where the keyer tube is used or how much current is drawn, within limits that will be mentioned later.

The circuit in Fig. 1 shows a tube keyer that may appear elaborate at first glance, but that is only because it has been designed to give some degree of adjustment after installation. The number of tubes used in parallel is determined by the current through the keyed circuit. The 80 rectifier, T_1 , C_1 and R_1 comprise a power supply that provides the necessary cut-off voltage for the keyer tube. R_2 , R_3 and R_4 are used instead of a

* Assistant Technical Editor, *QST*.

¹ Goodman, "Some Thoughts on Keying," *QST*, April, 1941.

Articles on keying the past two months have shown how it is impossible to design a single key-click filter that will handle the keying of any transmitter. However, it is possible to build a "little black box" that will handle any rig, provided the rules set forth in this and the previous articles are observed, and this story points out the important factors in the construction and use of the "little black box" — or tube keyer, as it is known to most.

Clickless and Safe Keying of the Transmitter

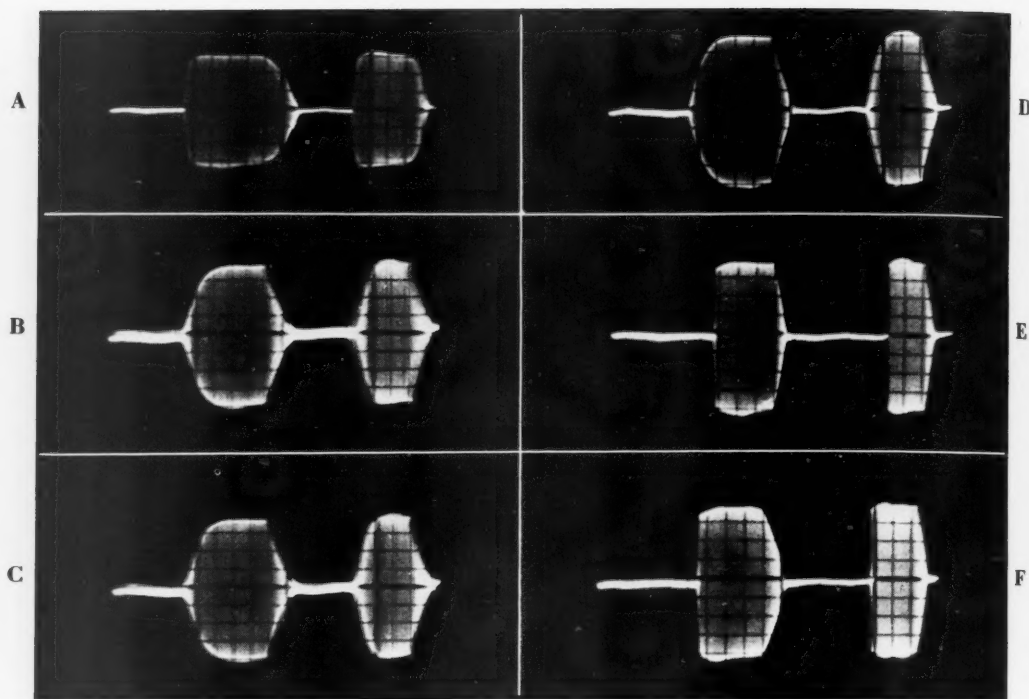


Fig. 3 — Oscillograms of a crystal oscillator-neutralized amplifier transmitter tube keyed at 50 w.p.m. The amplifier is battery biased to beyond cut-off.

A — Oscillator keyed same as Fig. 2-D. B — Amplifier keyed in negative lead with same lag as A. C — Amplifier keyed in center tap with same lag as B. Note that there is practically no difference when an amplifier is keyed in negative lead or center tap, in contrast to Figs. 2-E and 2-F. D — Oscillator and amplifier both keyed in negative with same lag as C. There is practically no difference between B, C and D. E — Oscillator and amplifier both keyed in center tap, with same lag as D. Here again is shown the reduced lag obtained when using center-tap keying of an oscillator, resulting in clicks that are almost impossible to eliminate. F — Same as E but with lag increased to 0.005 μ fd. and 10 megohms.

adjusted by control of the constants in the grid circuit. Adding capacity across the grid circuit softens both "make" and "break," and adding resistance between the key and R_2 softens the "break." The use of high resistances and small capacities is convenient and results in a small demand on the blocking voltage power supply. They also make the key absolutely safe to handle.

Practical Considerations

The tube keyer can take almost any physical form, ranging from a unit built into the transmitter to a separate unit that can be mounted on the operating desk. The unit shown in the photograph was used to obtain the oscillograms and experimental data and is unnecessarily elaborate, except where considerable current is being keyed or where only a very low voltage drop is permissible. The resistance of a 45-type tube with zero grid bias runs from 1800 ohms at 50 ma. current to about 2600 ohms at 20 ma., resulting in a 90-volt drop at 50 ma. and a 52-volt drop at the lower current level. Tubes in parallel reduce the drop in proportion to the number of tubes used.

Type 2A3 tubes were tried in the keyer but, among five different tubes, none were found that would cut off completely, even with 450 volts on the grids. This would not be important if an amplifier were being keyed because the current passed is only a milliampere or so, but when used to key an oscillator it was enough to allow the oscillator to operate, resulting in a signal in the receiver and prohibiting break-in operation on one's own frequency. Leakage across the tube base and socket and/or leakage through Sw_2 and its associated condensers were all eliminated as possible reasons for this slight current, and we are at a loss to explain the phenomenon. However, the only reason for wanting to use 2A3's is that they would have a lower voltage drop, and 45's are enough cheaper to make connecting a number of them in parallel quite economical.

The condensers used in the lag circuit (C_2 and C_3) should be good mica condensers, to avoid any trouble with leakage giving a voltage-divider effect and reducing the voltage at the grids. It is advisable to use a good paper condenser for C_1 in order to guarantee that the blocking voltage will

be constant and not somewhat dependent upon the leakage of the condenser.

Where and What to Key

If the transmitter consists of only an oscillator, or an oscillator and low-powered amplifier, it is recommended that the entire transmitter be keyed in the negative lead, as suggested in previous articles.^{1,2} However, this results in placing the full plate voltage across the key and represents some danger of shock. On the other hand, a tube keying system allows one to place his hand directly across the key terminals (if he wants to) without feeling the slightest shock. The reason, of course, is that a high resistance (R_2 plus R_3 or more) is in series with the bias voltage and the key, and the current through the key is so slight that no shock can be felt. However, one should never try the experiment with less than a megohm in series because then the current is not limited to such a low value.

A high-powered transmitter should also be keyed in the low-power stages, and in the oscillator if break-in is to be used. Some years ago there was considerable justification for high-level keying (of which primary and rectifier keying were probably the most successful) because fixed bias was uneconomical to obtain. However, the use of regulator tubes of the VR-150 and VR-105 types allows an economical bias supply to be built,³ and we can see little or no justification for high-level keying. By using a minimum of fixed bias on the stages following the keyed stage, as suggested previously,¹ the keyed characteristic can be satisfactorily maintained throughout the transmitter and no serious clicks should be encountered. The power supply used to furnish blocking voltage for the keyer tube (or tubes) can also be used in conjunction with the regulator tubes to provide bias for the stages of the transmitter following the keyed stage.

² Goodman, "Keying the Crystal Oscillator," *QST*, May, 1941.

³ McCullough, "Another Approach to High Power," *QST*, Feb., 1940.

If cathode (or center-tap—the two are identical) keying is used at the present time in one's oscillator, the tube keyer can be used with very few changes. The plate of the keyer tube is connected to the cathode of the oscillator, and the filament of the keyer tube is connected to the ground of the transmitter. The grid leak return of the oscillator is then moved from ground to the cathode, as are any r.f. by-pass condenser returns in the oscillator, and you are keying in the negative lead. The tube keyer can be used in cathode keying, too, but the lag will not be as effective and cannot be made very great, as pointed out in a previous article. If an amplifier is keyed, the excitation will be on the keyed stage constantly, and it makes little or no difference whether negative or cathode keying is used. In this case, the keyer tube output terminals can go directly to the old keying terminals of the amplifier (if cathode or negative keying is used) with the proper polarity to allow current to flow through the keyer.

The tube keyer seems to be the answer to satisfactory keying. Having established that negative power lead keying responds best to the addition of lag, the obstacle of high voltage across the key presents itself. However, with a tube keyer one can inadvertently place his hand directly across the key without the slightest shock, provided the resistance in series with the key and blocking voltage is high, as previously mentioned. The only other way we know to make a key safe is to use a relay, which is not always convenient or desirable. Further, the use of an inductance-capacity filter means trying many different values until the proper combination is hit upon, and this can be a lengthy and expensive process if one isn't connected with a dealer or manufacturer. On the other hand, the tube keyer will give the same desirable characteristic in many different transmitters, and it uses inexpensive resistors and condensers instead of iron-core chokes and, in some cases, high-capacity condensers. Combining the keyer blocking-voltage supply with the bias supply is economical enough to appeal to anyone and should certainly overcome any last objection one might offer to the use of the system.



Strays

Regarding a stray on page 98 of *QST* for April stating that the pamphlet, "Instructions for the Operation and Calibration of Radio Direction-Finding Equipment," could be obtained from the Government Printing Office for 5 cents, it has been reprinted and the cost is now 10 cents.

— Jim Conrad.

★ WHAT THE LEAGUE IS DOING ★

F.C.C. NOTES

BY VIRTUE of a considerable increase in personnel, the amateur unit of the FCC licensing section is now nearly caught up in the handling of amateur licenses. . . . As many amateurs are aware, there has been considerable confusion about the operation of Sec. 12.93b of our regs, which permits change of residence for a period not exceeding four months by invocation of portable procedure rather than by modification. Some amateurs have endeavored to employ this device to authorize one-day operation of portable equipment, and in the attempt to stop such abuses some amateurs have been denied the normal right to make a temporary move of a fixed station. This situation is now under study and will probably result in a clarifying order or regulation which, while preventing abuses by probably putting a minimum limit on bona-fide moves, will continue the intended purpose of the section. . . . Gerald C. Gross, W3GG, ex-2BFY, has been appointed assistant chief engineer of FCC in charge of the broadcast division. For some years chief of the international division of FCC's engineering department, he has represented the government at twenty-one international communications conferences, where we could always count on him as a friend of the amateur. Since 1933 he has also been secretary of the important Interdepartment Radio Advisory Committee. As chief of the international division, he has now been succeeded by his former assistant, Philip F. Siling.

N.C.R. ABOLISHED

BECAUSE most of its men are already in the service, the peace-time organization and training of the NCR have been discontinued, all units and sections abolished, and there are no more drills and instruction classes. The national drill circuit, too, has now been suspended. The remaining V-3 enlisted men are to be ordered to training soon and C-V(S) officers are also being ordered up.

ACTING DIRECTORS

ARRL by-laws provide that upon the giving of notice by a director that he is unable to perform his functions, the alternate director takes over the office with all the powers of director. The exigencies of national defense have now taken two of our directors from their divisions, and they have turned over their affairs to their alternates:

Ensign William A. Green, W5BKH, of Abilene, Texas, has assumed activity duty at the naval

air station at Pensacola, Florida, and for the year ending April 9, 1942, the functions of West Gulf Division director have been taken over by W. T. Caswell, Jr., W5BB, of Austin, Texas, the alternate director.

Fred W. Young, W9MZN, Dakota Division Director, is on leave of absence from the Mankato State Teachers' College, serving as a ground school supervisor for the Civilian Pilot Training Service of the CAA. He has now been transferred out of his division to the Milwaukee district office of his organization, and so has turned over the functions of director of the Dakota Division until the coming autumn to his alternate, Adolphus A. Emerson, W9ITQ, of Minneapolis.

BOARD MEETING

THE Board of Directors held its annual meeting in Hartford on May 9th-10th with all divisions represented, its first assembly under President Bailey. As always, the Board first accumulated a background of information by hearing reports from all the directors, from its committees and from the officers of the League, and then addressed itself to new business. The complete story is told in the appended minutes, but here are the highlights.

National defense, of course, received prime consideration and the Board devoted many hours to defense matters and the future of amateur radio. The facilities of the amateur institution were again pledged to the government, while at the same time the extraordinary powers and means granted the President a year ago were reaffirmed. Provisions were made for assuring that newly-licensed amateurs are fully informed on new regulations and on ARRL precautionary practices and their coöperation enlisted in our mutual need to keep clean noses.

Amateur radio is a great training school. From it come not only enlisted operators for the services but expert technicians, designers, engineers, production men, candidates for commission and communication executives. The Board believes that at such a time as this we ought to do something to accelerate the training afforded by the actual practice of ham radio. After long deliberation they decided to ask FCC to set up, for the duration of the emergency, a special temporary type of amateur license which will have c.w. privileges only and which will have a life of but one year, nonrenewable, during which time the holder can qualify for a regular type of license. It is suggested that the new type be called Class D and that it be available at a code speed of but 7 w.p.m. and with a simpler written ex-

amination. The idea is that it takes too many months to get up to 13 or 15 w.p.m. on a buzzer, while every amateur knows from his own experience that, once one is on the air, speed is increased rapidly. It is believed that this plan will bring new amateurs up to 15 or 20 w.p.m. months sooner than is possible under our present license structure.

The only other requests made of FCC were to extend 10-meter 'phone down to 28,100, and to open up 29,250-30,000 kc. to f.m. This is the harmonic of the 5-meter f.m. assignment.

The Board spread on its records resolutions of grief at the loss of Treasurer Hebert, ordered a tablet to his memory at WIAW. David H. Houghton, for twenty years *QST*'s circulation manager, was appointed acting treasurer, in some of which duties he has been participating in recent years.

One of the most far-reaching acts of the Board was the establishment, effective July 1st, of two classes of ARRL membership — as a result of studies that have gone on for several years. Henceforth, any person interested in amateur radio is eligible to be an Associate Member of ARRL but only a licensed amateur is eligible to be a Full Member with voting rights. Particulars will appear in our next issue. The arrangement will not become effective in Canada until three months after the resumption of licensing. In fact, because Canadian elections cannot now be held within the spirit of the by-laws, the Board ordered that the Canadian SCM's and the Canadian General Manager and his alternate shall continue in office during the present unsettled period, with new elections to be held as soon as possible after the resumption of licensing. . . . The Constitution was amended to exclude the President and Vice-President from voting on further amendments thereto, as well as amendments to by-laws — although, under our rules of order, our president has long been authorized to vote only to make or break a tie.

A proposal that the SCM's be appointed by the directors instead of elected by members was roundly defeated. Both the SCM's and the operators at WIAW were given special thanks by the directors for their excellent work of the past year, and the arrangement to send SCM's and QSL Managers to division conventions was continued. The Planning Committee was discharged with thanks, since present conditions do not permit it to perform useful work. The important Finance Committee of course was continued, and Canadian Manager Reid was again named as its chairman, its other members for the coming year being Directors Caveness and Norwine. . . . The Chicago gang reported that business conditions were not propitious for a 1941 national convention, and this conclusion was ratified. . . . The Communications Manager was asked to study the possibility of West Coast stations for code pro-

ficiency work, and some alterations in the BPL box score.

You will find numerous other interesting matters mentioned in the minutes and gradually creeping their way into our affairs, but this is all we have time for now if we are to get the news into June *QST*. Here are the minutes themselves:

MINUTES OF 1941 ANNUAL MEETING OF THE BOARD OF DIRECTORS AMERICAN RADIO RELAY LEAGUE

May 9-10, 1941

Pursuant to due notice and the requirements of the by-laws, the Board of Directors of the American Radio Relay League, Inc., met in regular annual session at The Hartford Club, Hartford, Conn., on May 9, 1941. The meeting was called to order at 10:11 A.M., Eastern Daylight Saving Time, with President George W. Bailey in the chair and the following other directors present:

Charles E. Blalack, Vice-President
Alexander Reid, Canadian General Manager
E. Ray Arledge, Delta Division
John E. Bickel, Southwestern Division
Hugh L. Caveness, Roanoke Division
Goodwin L. Dosland, Central Division
William T. Caswell, Jr., West Gulf Division (alternate, acting)
Robert A. Kirkman, Hudson Division
W. Bradley Martin, Atlantic Division
J. Lincoln McCargar, Pacific Division
Percy E. Noble, New England Division
Floyd E. Norwine, Jr., Midwest Division
William C. Shelton, Southeastern Division
C. Raymond Stedman, Rocky Mountain Division
Karl W. Weingarten, Northwestern Division
Fred W. Young, Dakota Division

There were also present Secretary K. B. Warner, Communications Manager F. E. Handy, General Counsel Paul M. Segal, Assistant Secretary A. L. Budlong and, as technical adviser to the Board, George Grammer, technical editor of *QST*. At the invitation of the Board, there was also in attendance, as a nonparticipating observer, Alternate Director Clayton C. Gordon, New England Division.

The Chairman, in his opening remarks, paid tribute to the League's late treasurer, Arthur A. Hebert, and the meeting stood silent a moment to his memory.

On motion of Mr. Arledge, unanimously VOTED that the minutes of the 1940 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

On motion of Mr. Norwine, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

On motion of Mr. Caveness, VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board. Mr. Kirkman requested to be recorded as voting opposed.

On motion of Mr. Dosland, after discussion, VOTED that the Board, having considered its several mail actions of the previous year, now ratifies the actions taken and decides to take these positions

as follows: (a) to postpone taking the poll of sentiment on increasing the width of 'phone bands — as of June 20, 1940; (b) to approve the draft of an article in *QST* on the business survey of the League — as of July 23, 1940; (c) to request the Federal Communications Commission to establish a Class D license — as of February 17, 1941. Mr. Kirkman requested to be recorded as voting opposed.

Mr. Reid, chairman of the Finance Committee, presented a report on behalf of his committee. On motion of Mr. Martin, unanimously VOTED to receive the report and to thank the committee for its work.

Mr. Reid made his annual report as Canadian General Manager. In turn, every division director read and submitted a written report on conditions in his division, for the common information of the Board.

The Board was in recess from 11:37 A.M. to 11:44 A.M. Proceeding to a consideration of subjects raised by individual directors at their own initiative:

Moved, by Mr. McCargar, pursuant to notice given a year before, to amend Article VII of the Constitution by inserting the words "excepting the President and Vice-President" after the words "Board of Directors." The yeas and nays being ordered, the said question was decided in the affirmative: Whole number of votes cast, 15; necessary for adoption, 12; yeas, 13; nays, 2. Those who voted in the affirmative are Messrs. Arledge, Bickel, Caveness, Dosland, Caswell, Kirkman, Martin, McCargar, Norwine, Shelton, Stedman, Weingarten and Young. Those who voted opposed are Messrs. Noble and Reid. Messrs. Blalack and Bailey abstained. So the Constitution was amended as proposed.

On motion of Mr. McCargar, unanimously VOTED to approve the holding of a Pacific Division convention at Fresno, California, November 8-9, 1941, under the auspices of the San Joaquin Valley Radio Club.

Moved, by Mr. Shelton, that the next annual meeting of the Board be held in Florida. But, after discussion, with the permission of his second, Mr. Shelton withdrew the motion.

On motion of Mr. Shelton, unanimously VOTED that the Board gives to Mr. Handy and his department a vote of thanks and congratulations for the splendid manner in which they have executed the League's code proficiency program. Mr. Handy thanked the Board but stated that such credit should be shared with the Secretarial Department for grading the papers and issuing the certificates.

On motion of Mr. Shelton, after discussion, unanimously VOTED that the President is requested to appoint a committee to investigate "Ham Haven," with a view to determining the desirability of its approval or sponsorship by the League.

Moved, by Mr. Caswell, that the ARRL at the earliest possible moment send a friendly circular letter containing no direct soliciting of membership to all licensed but non-ARRL stations in the United States and Possessions, stating briefly the present position of the radio amateurs, all new regulations recently adopted, the operating code deemed desirable by the ARRL because of existing conditions and the reasons for adopting this code, the possible penalties not only to the individual but also to all amateurs resulting from violation of FCC orders at this time, and enlisting the cooperation of all amateurs in the common cause; this not to be an

alarming or dictatorial document but just a friendly statement of facts and a plea for cooperation. After discussion, Mr. Caswell, with the consent of his second, withdrew the motion and moved that the ARRL at the earliest possible moment prepare a friendly circular letter containing no direct soliciting of membership and send same to all newly-licensed but non-ARRL stations in the United States and Possessions, stating briefly the present position of the radio amateurs, all new regulations recently adopted, the operating code deemed desirable by the ARRL because of existing conditions and the reasons for adopting this code, the possible penalties not only to the individual but also to all amateurs resulting from violation of FCC orders at this time, and enlisting the cooperation of all amateurs in the common cause; this letter also to be made available in quantity to directors, SCM's, Official Observers, and other League officials, the Official Observers being requested to send same during the next year to offending stations observed by them. After further discussion, on motion of Mr. Caswell, VOTED to amend the pending motion to provide that the contemplated circular letter may contain or be accompanied by matter soliciting membership in the League. The question then being on the adoption of the original motion as thus amended, the same was ADOPTED.

Moved, by Mr. Caswell, that it be adopted as policy that two Official Observer reports or one FCC citation for illegal operation, in a period of one year, be sufficient to disqualify ORS, OPS, or RM appointees. During the ensuing discussion the Board recessed for luncheon from 12:57 P.M. to 2 P.M., reconvening with all persons hereinbefore mentioned present. After discussion, Mr. Caswell, with the consent of his second, withdrew the motion.

On motion of Mr. Martin, unanimously VOTED that the Board will adopt resolutions on the passing of its treasurer, Arthur A. Hebert, these resolutions to be presented to his widow; that a plaque to his memory shall be procured and placed on the wall of station W1AW, similar to those erected to the memory of Messrs. Stewart and Hull; that the sum of fifty dollars (\$50) is hereby appropriated for this purpose from the surplus of the League as of this date, any unexpended remainder of same to be restored to surplus.

On motion of Mr. Martin, unanimously VOTED that, in view of the impracticability of carrying on planning work under present conditions, the Planning Committee is discontinued for the present; that it is discharged with thanks and that the Board shall express to each member of the committee its appreciation of the service rendered by means of a letter signed by the President; that the Communications Manager is also thanked for his efforts and additional duties in connection with the work of this committee.

On motion of Mr. Martin, VOTED that the Secretary is directed to take steps to compile and retain for future reference as much data as possible on amateur personnel in the national defense service; that the cooperation of the military services and defense industries should be sought, to make the survey as complete as possible; that the Secretary is authorized to retain data as confidential where the sources consider it should be classified as restricted or confidential.

Moved, by Mr. Martin, that the Federal Com-

munications Commission be requested to permit the use of frequency-modulated emission within the frequency band 28 to 28.5 Mc. for amateur communication for a period of not less than one year. But there was no second, so the motion was lost.

Mr. Dosland read a report from the Chicago committee for the 1941 national convention, addressed to the Chicago Area Radio Club Council, recommending that the 1941 convention be postponed. On his motion, unanimously VOTED that the recommendations of the General Committee for the 1941 ARRL National Convention, as approved by the Chicago Area Radio Club Council, are accepted and placed on file and are ratified by the Board.

On motion of Mr. Dosland by unanimous VOTE, affiliation was granted the Joliet Amateur Radio Society, Joliet, Illinois, and the Dial Radio Club, Middletown, Ohio.

Moved, by Mr. Young, that By-Law 9 be modified to read, "The Section Communications Managers shall be appointed for a two-year term of office by the director of the division in which the section in question is located"; that By-Law 10 be amended by striking out the second and third words and substituting the words "appointee to," and by striking out the last six words; that By-Law 11 be amended by changing the word "election" to "appointment." After discussion, the yeas and nays being ordered, the said question was decided in the negative: Whole number of votes cast, 15; necessary for adoption, 10; yeas, 1; nays, 14. Mr. Young voted in the affirmative; every other director (except the President and Vice-President) voted opposed. So the proposal was rejected.

Moved, by Mr. Arledge, that the sum of four hundred dollars (\$400) be hereby appropriated from the surplus of the League as of this date for the purpose of defraying the traveling expenses of the Section Communications Managers of the League, within the continental limits of the United States, to attend one official ARRL convention within their respective divisions in the period between this date and the date of the next annual meeting of the Board; reimbursement to be made at the rate of two cents per mile via the shortest commonly-traveled route, plus one night's hotel accommodation at \$2.50, and an allowance of the registration fee; allowance of these expenses to be subject to approval by the Communications Manager upon examination of detailed report of the activities of the Section Communications Manager at each such convention, to be submitted with his expense account; and any unexpended remainder of this appropriation at the date of the holding of the next annual meeting of the Board to be restored to surplus. On motion of Mr. McCargar, unanimously VOTED to amend the motion to change the amount of the appropriation to five hundred dollars (\$500) and to provide the further purpose of defraying the traveling expenses of the QSL Managers of the League, within the continental limits of the United States, to attend one official ARRL convention within the call areas for which they are the respective QSL Managers during the time between this date and the date of the holding of the next annual meeting of the Board, provided that such convention be within a radius of 500 miles from the QSL Manager's place of residence; and to require a similar report from the QSL Manager as a condition to the allowance of his expenses. The

OFFICERS' REPORTS AVAILABLE TO MEMBERS

In April of each year the officers of the League make comprehensive written reports to the directors. The Board of Directors has made these reports available to the membership of the League. Interested members may obtain copies postpaid at the cost price of 50¢ per copy. Address the Secretary at West Hartford.

question then being on the adoption of the amended motion, the same was unanimously VOTED.

On motion of Mr. Arledge, unanimously VOTED that the Board extends an expression of its thanks for the excellent services rendered the League by the Section Communications Managers during the past year.

On motion of Mr. Arledge, VOTED that the Board, having examined its action of last year in which it granted the President extraordinary powers to act as a committee of one in all aspects of protecting amateur operation, and in which it made an open authorization of ten thousand dollars (\$10,000) available to him for the defense of amateur frequencies, now reaffirms those actions. Mr. Kirkman asked to be recorded as abstaining from voting.

Moved, by Mr. Kirkman, that, in view of the fact that the two operators of W1AW represent the League to thousands of amateurs who contact and visit W1AW, and whereas it should be the policy of the Board to express its appreciation of a job well done, the salaries of Hal Bubb and George Hart be increased (to certain suggested figures). After discussion, on motion of Mr. Martin, unanimously VOTED to amend the pending motion by striking out its entire text and substituting the provision that the Secretary and Communications Manager are requested to examine the salaries of the operating personnel at W1AW and to make suitable increase if it is found to be warranted. The question then being on the adoption of the original motion as thus amended, the same was unanimously VOTED.

Moved, by Mr. Kirkman, that the Secretary be instructed to arrange suitable means for accumulating accurate numerical data on the number of League members who are licensed amateurs in each League division; that he also compile data based on population and/or FCC amateur license bureau data showing the probable number of amateurs licensed in each League division; this information to be revised at least once a year and available to directors and officers of the League. But, after discussion, the motion was rejected.

Moved, by Mr. Kirkman, that the Secretary be instructed to establish and make use of a system similar to that used by Mr. Handy in disseminating RM-Nite information, to the end that each member of the Board of Directors may be familiar with the opinions and activities of his colleagues in connection with the various subjects and questions which arise between Board meetings. But, after discussion, the motion was rejected.

Moved, by Mr. Kirkman, that the Communications Manager be instructed to organize as soon as practicable a system of spectrum observation and

report, whose purpose shall be to maintain a master chart or file with accurate and up-to-date information concerning the use of the entire radio spectrum by any station whatsoever, and so conceived that irregular or unusual use of any frequency shall be immediately apparent; this information to be made available to any director, to any officer of the League and, at the discretion of the Secretary, to any government official or agency. But, after discussion, the motion was rejected.

Moved, by Mr. Kirkman, that, in view of its large membership, the Hudson Division annual appropriation be increased to three hundred dollars (\$300); that the sum of one hundred dollars (\$100) be hereby appropriated to increase the 1941 appropriation to that figure; and, that from the unexpended balances of Hudson Division appropriations for the past six years amounting to the sum of \$458.72 and subsequently returned to surplus, there be appropriated the sum of two hundred dollars (\$200) for the primary purpose of underwriting Hudson Division conventions, which sum shall be earmarked for the Hudson Division and shall remain to the credit of the Hudson Division director until expended. After discussion, on motion of Mr. Young, VOTED to amend the motion by striking out the portion after the semicolon relating to an appropriation for division conventions. After further discussion, on motion of Mr. Stedman, the amended motion was put on the table.

Moved, by Mr. Kirkman, that the Secretary be instructed to request the FCC to assign to the amateur service a frequency band from 448 Mc. to 460 Mc., to be open to all classes of transmissions. But, after discussion, the motion was rejected.

The Board was in recess from 4:00 to 4:05 P.M.

On motion of Mr. Norwine, affiliation was unanimously VOTED the following investigated societies:

Waltham Amateur Radio Association.....Waltham, Mass.
YL Radio Club.....St. Louis, Mo.
Unit Number Three, North-
Minnesota Amateur Radio As-
sociation.....Coleraine, Minn.
Fayette Radio Club.....Kincaid, W. Va.
San Diego Radio Club.....San Diego, Calif.
La Crosse Radio Amateur Club,
Inc.....La Crosse, Wise.
The Mount Rushmore Radio
Club.....Sturgis, So. Dak.
Moscow Radio Operators Club.....Moscow, Idaho
Radio Explorer Troop 501.....St. Louis, Mo.
Greensboro Radio Club.....Greensboro, N. C.
Richmond Radio Club.....Richmond, Calif.

On motion of Mr. Norwine, unanimously VOTED to convey the thanks and congratulations of the Board to Messrs. Harold Bubb and George Hart for the splendid manner in which they are handling W1AW and for their courtesy shown to visiting amateurs.

Moved, by Mr. Noble, that the FCC be approached on the idea of notifying by mail all holders of amateur licenses of all changes in regulations affecting amateur operation; if absolutely necessary, we would favor a nominal fee for amateur licenses to defray the expenses of same. After discussion, on motion of Mr. Stedman, unanimously VOTED to strike out the portion after the semicolon relating to a fee. After further discussion, the question being

on the adoption of the amended motion, the same was rejected.

Moved, by Mr. Noble, that a 10 per cent tax be placed on the net profits of all official ARRL conventions in a division to build up a fund to be held by the director of a division to permit him to underwrite future official conventions to the following extent: no more than 25 per cent of the total fund could be used to reimburse loss at any one convention. But, after discussion, with unanimous consent, Mr. Noble withdrew the motion.

On motion of Mr. Noble, after discussion, unanimously VOTED that, since many traffic-handlers feel that 100 deliveries should not qualify an amateur for the BPL in QST, the Communications Manager is instructed to make a further study of this matter, to see whether traffic-handling amateurs would not be more accurately rated if deliveries counted less than at present, and that he is directed to change the figure of 100 deliveries if, in his opinion, it would be in the general interest so to do.

On motion of Mr. Weingarten, after discussion, VOTED that the Communications Manager is directed to make a further study of, and to report back to the Board by mail the feasibility of, transmitting code proficiency runs and code practice from an amateur station or stations on the Pacific Coast.

The Chair here appointed two committees: On the Hebert resolutions, Messrs. Martin and Caveness. To investigate Ham Haven, Messrs. Shelton (chairman), Dosland and Norwine.

Moved, by Mr. Caveness, that there be hereby appropriated from the surplus of the League as of this date, the sum of three thousand two hundred dollars (\$3200) for the purpose of defraying the expenses of holding this meeting of the Board of Directors, any unexpended remainder of the sum to be restored to surplus. On motion of Mr. Young, unanimously VOTED to amend the motion to add the provision that the Secretary be instructed to report to the directors the expenses of each director. The question then being on the adoption of the motion as amended, the same was unanimously VOTED.

On motion of Mr. Caveness, after discussion of the necessary figures, unanimously VOTED that the sum of three thousand three hundred and seventy-five dollars (\$3375) is hereby appropriated from the surplus of the League as of January 1, 1942, for the legitimate administrative expenses of directors in the calendar year 1942, said amount allocated to the Canadian General Manager and to the division directors as follows:

Canadian General Manager.....	\$ 150
Atlantic Division Director.....	200
Central Division Director.....	400
Dakota Division Director.....	200
Delta Division Director.....	250
Hudson Division Director.....	300
Midwest Division Director.....	225
New England Division Director.....	175
Northwestern Division Director.....	250
Pacific Division Director.....	200
Roanoke Division Director.....	150
Rocky Mountain Division Director.....	200
Southeastern Division Director.....	175
Southwestern Division Director.....	200
West Gulf Division Director.....	300
	<hr/> \$3375

Any unexpended remainders of these funds at the end of the year 1942 to be restored to surplus.

The Board was in recess from 5:08 P.M. to 5:17 P.M.

Moved, by Mr. Norwine, that the Secretary be instructed to request the Federal Communications Commission to extend the 10-meter 'phone band down to 28,100 kc., and to make available the use of f.m. 'phone emission in the frequencies 29,250 to 30,000 kc. Moved, by Mr. Kirkman, to amend the motion to provide that the frequencies 28,100 to 30,000 kc. shall be open also to A-2 emission; but, after discussion, the proposal was rejected. After further discussion, Mr. Norwine, with the consent of his second, withdrew the pending motion. On the further motion of Mr. Norwine, VOTED, 10 votes in favor to 4 opposed, that the Secretary is instructed to request the Federal Communications Commission to extend the 10-meter 'phone band down to 28,100 kc., so that the 'phone allocation reads 28,100 to 30,000 kc. Messrs. Reid and Caswell requested to be recorded as voting opposed, and Mr. Weingarten asked to be recorded as not voting. On motion of Mr. Stedman, VOTED that the Secretary is instructed to request the Federal Communications Commission to make available the use of f.m. 'phone emission in the frequencies 29,250 to 30,000 kilocycles.

On motion of Mr. Shelton, VOTED, 7 votes in favor to 6 opposed, that the Board recommends to manufacturers of amateur receivers the adoption of a uniform standard for S scales.

On the Secretary's proposals to alter the requirements for membership in the League, moved, by Mr. McCargar, (1) that the Constitution and By-Laws be amended as follows:

Article II: Replace Paragraph 1 with the following:

1. The membership of the League shall consist of:

a) Full Members, who shall be entitled to all rights and privileges of the League;

b) Associate Members, who shall be entitled to all rights and privileges of the League except the right to vote in the affairs of the League and the right to hold the office of Director or Alternate Director except as may be hereinafter provided.

Whenever the general term "member" or "members" is used in this Constitution or in the By-Laws, it shall apply equally to both grades of members.

THE A.R.R.L. BOARD OF DIRECTORS PAUSES IN ITS 1941 MEETING TO BE PHOTGRAPHED

Left to right, front row: Goodwin L. Dosland, W9TSN, Central Division; H. L. Caveness, W4DW, Roanoke; Charles E. Blalack, W6GG, Vice-President; George W. Bailey, W1KH, President; K. B. Warner, W1EH, Secretary; Floyd E. Norwine, Jr., W9EFC, Midwest. Second row: Percy C. Noble, W1BVR, New England; W. T. Caswell, Jr., W5BB (Acting Director), West Gulf; Robert Akeridge Kirkman, W2DSY, Hudson; Clayton C. Gordon, W1HRC (Alternate), New England; C. Raymond Stedman, W9CAA, Rocky Mountain; Paul M. Segal, ex-W3EEA, General Counsel. Third row: George Grammer, W1DF, Technical Advisor; Alex Reid, VE2BE, Canadian General Manager; J. L. McCargar, W6EY, Pacific; Fred W. Young, W9MZN, Dakota; John E. Bickel, W6BKY, Southwestern; F. E. Handy, W1BDI, Communications Manager. Rear row: Walter Bradley Martin, W3QV, Atlantic; A. L. Budlong, W1JFN, Assistant Secretary; Karl W. Weingarten, W7BG, Northwestern; E. Ray Arledge, W5SI, Delta; William C. Shelton, W4ASR, Southeastern.



2. To be eligible for Full Membership an applicant, at the time of his application, must be a resident of one of the administrative divisions of the League in the United States & Possessions or in the Dominion of Canada, as defined in the By-Laws, and must be either:

a) the holder of either an amateur radio station license or an amateur radio operator's license or both, issued by the administration of the country of which he is a citizen. Such Full Membership shall be granted for no longer than one year at a time, and the holding of an amateur radio license must be demonstrated before each renewal for an additional year; *provided*, however, that if such a Full Member becomes without amateur radio license during a year for which he has been accepted as a Full Member, he shall continue to possess all the rights of a Full Member until the expiration of the year but shall not be eligible to renew as a Full Member unless and until he again demonstrates the holding of an amateur radio license; or

b) a person who has held continuous and unexpired membership in the League since May 15, 1934.

3. Any person interested in amateur radio shall be eligible to Associate Membership.

4. Upon attaining possession of an amateur license, an Associate Member shall be transferred to Full Membership upon his application therefor, if he is otherwise eligible.

Renumber the remaining paragraphs of this Article. In what is now Paragraph 2, change the word "membership," in two places, to read "Full Membership." In what is now Paragraph 5, change the word "members" to "Full Members." Delete the comma after "matter"; insert a comma after the following word "and"; insert a comma after "reason."

Article IV: In Paragraph 1, change the word "members" to "Full Members."

By-Law 4: Change the word "member," in two places, to read "Full Member."

By-Law 5: Under the Pacific Division, delete the word "and" and substitute a comma, and at the end add the words "and the United States Possessions in the Pacific." Under the Southeastern Division, put a comma after "Alabama" and change the words "island of Puerto Rico" to "United States Possessions in the Caribbean."

By-Law 6: Delete the words "and Isle of Pines."
 By-Law 9: In the second sentence delete the words "its island possessions or territories, or the Republic of Cuba." Change "members" to "Full Members." In two places change "member" to "Full Member." At the end of the paragraph, delete the words "Newfoundland or Labrador" and put a period after "Canada." Then add the following new sentence:

Provided, however, that whenever the operating territory of a Section includes additional territory not part of the administrative divisions of the League but attached thereto for the activities of the Communications Department, Associate Members residing in the said attached territory and possessing amateur radio licenses shall be eligible equally with Full Members of the Section to hold or to nominate for and vote for the office of Section Communications Manager, provided they otherwise comply with the requirements of these By-Laws.

By-Law 13: Change "members" to "Full Members."

By-Law 18: Change "members" to "Full Members."

By-Law 19: Change "members" to "Full Members." Change "member" to "Full member."

By-Law 20: Change "member" to "Full Member." Change "members" to "Full Members." Delete the sentence reading: "No ballot shall be counted unless it shall affirmatively appear either from such ballot or the envelope in which it is contained that the member either is at the time the holder of an amateur radio station or operator's license or has been continuously since May 15, 1934, a member of the League."

By-Law 28: Change "members" to "Full Members."

(2) that, except in the Dominion of Canada, the above amendments become effective July 1, 1941, in the case of all applications for new membership or renewal of membership; provided, however, that they be without effect on memberships now in force until the same shall have run the period for which dues are now paid, but not to exceed one year from this effective date, such present members to continue to be governed for the remainder of their paid-up period of the said year by the provisions of the Constitution & By-Laws as they existed prior to these amendments; (3) that in the dominion of Canada these amendments become effective three months after the resumption of the issuance of amateur licenses by the Canadian Government, the one-year period above mentioned to be counted from that date. Moved, by Mr. Kirkman, to lay the subject on the table; but there was no second, so the motion was lost. After discussion, the yeas and nays being ordered, the question was decided in the affirmative: Whole number of votes cast, 15; necessary for adoption, 10; yeas, 15, nays, 0. Every director (except the President and Vice-President) voted in the affirmative. So the Constitution & By-Laws were amended as proposed.

Moved, by Mr. Norwine, that By-Law 5 (a) be amended by striking out the words "and the Philippine Islands" and inserting the word "and" after the word "Nevada"; and that By-Law 6 be amended by adding a new item at the end thereof,

reading "Philippine Islands — attached to the Pacific Division." After discussion, on motion of Mr. McCargar, unanimously VOTED to lay the subject on the table.

On motion of Mr. Norwine, after discussion, the Board by unanimous vote ADOPTED the following resolution:

In view of the facts that the Canadian membership of the League is temporarily at a low figure because of the effects of the war, with many members absent from their homes; that amateur licenses are temporarily not available in Canada; and that it is apparent that elections for Canadian General Manager, Alternate Canadian General Manager and Canadian Section Communications Managers cannot be held this year in conformity with the spirit of the by-laws; BE IT RESOLVED by the Board of Directors that By-Laws 9 and 28 be, and the same hereby are, declared inoperative until the further order of the Board, so far as they apply to the election of Canadian General Manager, Alternate Canadian General Manager and Canadian Section Communications Managers; and that in the meanwhile the incumbent Canadian General Manager, Alternate Canadian General Manager and Canadian Section Communications Managers shall continue to hold office; provided, however, that an election for these offices shall be held as promptly as possible after the resumption of Canadian amateur licensing.

On motion of Mr. Stedman, VOTED that the Board do proceed now to the selection of a new treasurer. At the request of the Chair, Messrs. Handy, Budlong and Grammer retired from the meeting. During the ensuing discussion, the Board was in recess for dinner from 6:45 p.m. to 8:23 p.m. On motion of Mr. Caveness, unanimously VOTED that, in view of the sudden death of our treasurer, and pursuant to Paragraph 11 of Article IV of the Constitution, the duties of treasurer shall be performed by David H. Houghton until the further order of the Board, he to have the title of Acting Treasurer. Messrs. Handy, Budlong and Grammer were thereupon recalled to the meeting.

At this point, the Board heard supplementary oral reports from the President, Vice-President, Secretary and Communications Manager, and devoted the remainder of the evening session to an examination of plans for national defense and the future of amateur radio. On motion of Mr. Norwine, the Board recessed at 10:05 p.m., under order to reconvene at the same place at 10 a.m. on the morrow. The Board reassembled on May 10, 1941, and was called to order at 10:06 a.m., with all directors and other persons hereinbefore mentioned in attendance except Messrs. Noble, Martin, Norwine and Gordon, who joined the meeting at 10:10 a.m. The morning session was similarly devoted to a discussion of plans for national defense and the future. During the morning the Board was in recess from 11:41 a.m. to 11:50 a.m., and from 12:02 p.m. to 12:15 p.m.

In the course of the foregoing discussion, the Board gave consideration to pending proposals for the establishment of a Class D amateur license. After long discussion, moved, by Mr. Dosland, that the Secretary be instructed to request the FCC, if the FCC concurs that such action would be in the national interest, to establish a Class D feeder type

of amateur license, to be nonrenewable and to have a term of not over one year, during which time the holder may qualify for a regular type of amateur license; such license to permit only A-1 operation on all amateur frequencies; to be made available upon passing a code speed of seven words per minute and a written examination simpler than the present requirements, and to be assigned a call distinctive from amateur calls of other amateur license qualifications. Moved, by Mr. Noble, to amend the motion by inserting the words "crystal control" before the words "A-1 operation"; but, after discussion, the proposal was rejected, Mr. Kirkman asking to be recorded as abstaining. On the question of the original motion, the same was thereupon adopted; Mr. Kirkman, the sole dissenter, asking to be so recorded for the reason that he feels the proposal does not solve the problem but his action not to be interpreted as a vote against national defense.

The Board was in recess for luncheon from 1:10 P.M. to 2:08 P.M., reconvening with all persons hereinbefore mentioned in attendance except General Counsel Segal.

Mr. Shelton, making a preliminary report for the committee on Ham Haven, requested further time for investigation, to report later to the President.

Mr. Martin, reporting for the resolutions committee, presented and moved the adoption of the following resolutions, the same to be prepared and delivered by the Secretary:

Whereas the board of Directors of the American Radio Relay League is now convened in its first session after the unfortunate death of our treasurer, Arthur A. Hebert; and

Whereas Arthur A. Hebert has served the League for a generation, as a loyal radio amateur, an inspiring leader and an efficient administrator; and

Whereas, as officers and directors of the League we are deeply grieved at the loss of our colleague as an amateur, as a co-worker and above all as a friend; now therefore

BE IT RESOLVED by the officers and directors of the American Radio Relay League in annual meeting assembled:

That we now record for the permanent records of the League our grief and sorrow at the passing of Arthur A. Hebert, and

That we extend to his bereaved family our sincerest condolence and sympathy.

Whereupon the same was adopted by a standing vote of the entire assembly.

The Chairman appointed to membership on the Finance Committee, for the following year, Mr. Reid, chairman, and Messrs. Norwine and Caveness.

Moved, by Mr. Stedman, that the FCC be requested to restore the twenty-word-per-minute code speed requirement for the Class A examination. But, after discussion showing that FCC probably would be opposed, Mr. Stedman, with the consent of his second, withdrew the motion.

Moved, by Mr. Kirkman, that the code practice speed of WIAW be reduced to five words per minute. But the motion was rejected.

On motion of Mr. Weingarten, unanimously VOTED that the sum of five hundred dollars (\$500) is hereby appropriated from the surplus of the League as of this date for the use of the Finance Committee, any unexpended remainder to be returned to surplus at the next annual Board meeting.

On motion of Mr. McCargar, unanimously

VOTED to take up the Philippine Island matter from the table. On his further motion, unanimously VOTED to adopt the following resolution:

In view of the new requirements for membership which make of the League an integrated organization of amateurs licensed by either the FCC or the Dominion of Canada, with the single exception of the Philippine Islands; and whereas the Philippine Islands are already quasi-independent and operate under entirely independent radio regulation and control; and whereas it appears that the administrative structure of the League would be improved by transferring the Philippine Islands from the Pacific Division to a status of attachment thereto which will preserve all our traditional operating relations with them but will overcome certain administrative inconsistencies: BE IT RESOLVED that the Secretary is directed to explain the situation to the members of the League residing in the Philippine Islands and to request them, in the name of the Board, to agree to the change in status, reporting the result of his canvass to the Board.

On motion of Mr. Stedman, the Board unanimously ADOPTED the following resolution:

Whereas the Board of Directors in annual meeting assembled is, as a result of a detailed deliberation, conscious of the responsibilities of the American Radio Relay League in the present national emergency;

BE IT RESOLVED that the League reaffirms its policy of wholehearted coöperation with our government in every feasible manner; and

Further, it urges upon all amateurs a similar attitude.

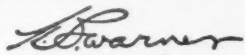
On motion of Mr. McCargar, unanimously VOTED that the Board grants a leave of absence to Communications Manager F. E. Handy for such time as his services may be required in the Navy.

Moved, by Mr. Noble, that there be established a new type of membership certificate, "Contributing (Full/Associate) Member", these certificates to be issued members contributing money to aid in the research and development work of the QST laboratory. But, after discussion, the motion was rejected.

Moved, by Mr. Noble, that any radio club, in order to qualify as an affiliated club, must have at least fifty-one per cent of its membership licensed amateurs and at least fifty-one per cent of these licensed amateurs must be League members. But, after discussion, the motion was rejected.

On motion of Mr. McCargar, after discussion, VOTED, 11 in favor to 5 opposed, that the sum of one hundred dollars (\$100) is appropriated from surplus as of this date as an additional allocation for the legitimate administrative expenses of the director of the Hudson Division in the calendar year 1941, any unexpended remainder of this sum at the end of the year 1941 to be restored to surplus. At this point Mr. Segal rejoined the meeting.

The Chairman thanked the members of the Board for their assistance and coöperation. On behalf of the Board members, Vice-President Blalack thanked the Chairman for the manner in which he had conducted the meeting. On motion of Mr. Caveness, the Board adjourned *sine die* at 2:51 P.M. Total time in session, 12 hrs., 17 min. Total appropriations, \$7,725.


Secretary

ON THE ULTRA HIGHS

CONDUCTED BY E. P. TILTON,* W1HDQ

IN PAST years April has been principally the month in which five-meter men sit around and wait for May. Not so April, 1941, however. A few bits of aurora refraction, some splendid temperature inversions, and the season's first sporadic-E DX kept Five unusually active in most sections of the country.

Unseasonably warm weather during the week of April 6th produced a welcome extension of operating ranges after the infrequent inversions of the winter months. A solid week of exceptional conditions for long range work was climaxed on April 12th, by one of the finest nights of inversion bending ever seen in the East at this time of year. Many contacts over distances up to 200 miles were made with low power and several up to 300 miles were made by the fellows having more power and good locations. Notable work was done by W3CGV, Wilmington, Del., and W3IIS, Rockdale, Md., in working numerous W1's and W2's at distances up to 300 miles.

After this strong inversion, followed by the first thunderstorm of the season, it was no great surprise to see the band open up for W4 on April 14th, two weeks ahead of schedule. W4FLH and W4CYU, Miami, Fla., were apparently the only W4's in on this, but they made the most of the opening. W4CYU, in his first experience with 56-Mc. DX, worked the following stations between 7:15 and 9:45 P.M.: W1's SI BJE JLI JIS AVV JTB HDQ; W2's AMJ FJQ DDV; W3's DI HFY AXU GUF CGV BKB. Bob first realized that the band was open when he heard the Empire State Television transmitter, W2XPS, on 55,750.

* 329 Central St., Springfield, Mass.



Stanley F. Brigham, W1MBS, West Roxbury, Mass. With nothing more than 10 watts input to a 76 oscillator, Stan has worked 122 different stations already this year.

Many additional reports on the aurora session of March 30th were received too late to be included in last month's brief summary. From these it appears that the territory extended out as far as South Dakota, making this one the most widespread on record. In addition to those acknowledged last month we wish to thank W8's KKD FGV QXV KQC and W9's ARN ANH and YKX for their reports. A recurrence was expected in late April, and the date of the Relay was set with this in mind, but the only signs of aurora seen as this is being written occurred on the nights of April 23rd, 24th, and 28th! Northern lights were visible on these dates, but the disturbances were of mild character and intermittent as well. Fuzzy carriers of 'phone stations were noted by several operators, but the only DX reports came from W1AVV, Stamford, Conn., and W1HXP, Newton, Mass., both of whom heard W8OPB on the 24th. These two worked each other on what appears to have been aurora-refracted c.w.

Your conductor picked the date of the April UHF Relay. It looked like a good guess last winter—but the fates that control such matters were most unkind, and the East had about the worst possible conditions during the entire contest period. If any relays were completed from the East Coast to any remote points we have not heard of it. The band opened up for the West, however, and a swell chance for a 56-Mc. Transcon was missed when W6ANN started a message on its way to your conductor in a surprise contact with W9ZJB. Vince got the message off to W9YKX, Woodbine, Iowa, but it died on Bill's hook. W9ZJB heard W6QAQ originating a message "To any East-Coast Amateur" at 11:30 A.M. CST. No signals were heard on Ten at the time, but W6ANN and W6MXY were worked, with signals similar to those heard from W6's on 28 Mc., being 20-25 db over S-9 for nearly two hours!

HERE AND THERE

THE high-pressure efforts of W9ZHB and others in behalf of horizontal polarization are gradually taking effect. Some Easterners now having horizontals of one form or another are W1SI, Revere, W1JDD, Waltham, W1AEP, Springfield, and W1HDQ, Wilbraham, in Massachusetts; W1LLL, Hartford, and W1KLJ, Bristol, Conn.; W1MEP/1, Vermont; W2AMJ, Bergenfield, N. J.; W3EZM, Langhorne, Pa.; and W3BZ, Danville, Va. There are many others. Installation of a horizontal extended double Zepp at Glastonbury Mountain, Vermont, brought up the signals of flea-powered W1MEP/1 to a consistent character for W1AEP in Springfield when the latter uses his new 3-element horizontal array.

W1DJ says that the roster of the New England Net now includes more than 50 calls! In the Thursday-night round-

ups there are often upwards of 25 active stations, with a record of 29 answering on April 17th. And out in Illinois the "Pink Network" makes a nightly check of the band at 7 P.M. This keeps interest up and W9ARN says that the boys in the Marathon no longer have any trouble making their activity points every night now. Organization does help!

Want a "marker" to show you when the band is open? Watch 58,970 for WIAW. Practically the entire WIAW schedule, including the code practice, now goes out on Five. And just outside the low end, at 55,750, is W2XPS, NBC Television station in New York City. This carrier (the sound channel) may be heard, often with little or no modulation, almost every evening. From the West Coast comes word that W6XAO (Don Lee Television) will soon be occupying the same channel on regular schedule. These should serve to reduce those periods of wondering if the band is open when no signals are heard coming through.

WIDEI/3 is back in Washington after a trip to South America. Trust Mel to get back in time for the opening of the DX season! It is hoped that Mel will be able to dig some more of the Washington gang out of hibernation. Activity all through the northern part of W3 seems to be going along at a new high. More stations are operating in the area around Philadelphia than at any time in the past two years. W3CGV at Wilmington remains the only station on Five in his state, Delaware. Look for Gary on 56,816. W3AXU sends along some unique car registrations! John got LO-73-K, while W3ABS has SL-73-S — sounds like a QSO on Forty!

W4GJO, Winter Park, Fla., is holding forth on 57,216, along with W4QN who is e.c.o. near the same frequency. They have W4BGZ coming along, and are desirous of working up some skeds with other Florida stations.

W5DXB, Vivian, La., lists W5's ML, AKI, ZS, EEL, EKV, CQV, and DXB as the active Louisiana group. Over in Texarkana are recent converts, W5BDB and W5DXW. The horizontal-vertical question comes up for discussion here, with all but Mims (W5BDB) and W5DXB using verticals. All these boys are hoping to be able to make the grade with W5AJG and other Texas stations. This is quite a hop, 180 miles, but not at all impossible.

W5VV has finally sold the band to one prospect! W5DNN came to Five the long way — all the way from the old 200-meter days as 5BR down through the successively higher frequencies. Eighty, Forty, Twenty, Ten — "and now the breathless delight of the first QSO on Five!" The rig is a Thordarson job, temporarily doubling in the final to 58,104 or 57,700. The receiver is an NC-101-X with QST's February converter ahead of it. The antenna is a 4-element "W6QLZ Beam."

Look to your coupling link if you're having trouble getting grid drive. Changing from a twisted pair to a concentric line, W5FSC, Huntsville, Texas, picked up eight of those elusive grid mills! Bud has been having tough luck with his antennas, though. He lost his long wire, and a new 4-element array erected for tests with W5VV, before the scheduled tests came off.

More horizontals, this time from California. W6QG reports that W6's LFN, Los Angeles, OFU, Compton, QUK, San Bernardino, MYS, South Los Angeles, and MXY, Lynwood, have been trying out horizontal polarization. Results have been generally poor, locally, because the new arrays are somewhat lower than the verticals with which comparisons are being made. Wait 'til the band opens, boys!

W6QVK and W6QLZ have been running tests on 56 and 112 Mc. before dawn! They find that signals are invariably good around 5 A.M., with a reduction as daylight comes. Ho-hum — we'll take your word for it, Clyde! Signals on 112 Mc. have been running fully as good as those on 56 in recent comparative tests at all hours.

W8KKD, Royal Oak, Mich., says that April was a very active month around Detroit. The warm weather early in the month helped out the extended-local work considerably. W8CIR, Aliquippa, Pa., and W8's QXV and OPB at Barberton and Dalton, Ohio, were contacted frequently with signals running S8-9 each way. The distance is around 200 miles in each case. Dusty reports that the polarization con-

U.H.F. MARATHON

Second period winner: W8CIR, Aliquippa, Pa., 271 points *

Call	Contacts Through April 15th				Score	States in 1941
	56	112	224	400		
W1AEP	43				313	6
W1AVV	60	34			389	8
W1BCT		7			21	2
W1DJ	73				266	4
W1EHT	37				204	2
W1EKT	51				229	3
W1HDQ ¹	112	19	4		827	10
W1IJ	23	15			209	4
W1JJR	1	35	1		163	2
W1KLJ	65	12			297	7
W1LCC	6	3			20	2
W1LLL	50	19			489	10
W1LSN	38				219	3
W1MBS		122			406	3
W1MEP	4				28	2
W2ADW	1	12			142	2
W2AMJ	99				628	10
W2BYM	17				60	4
W2COT	66				228	5
W2DZA		128			438	4
W2FJQ	42	10			199	8
W2LAL	62	5			257	4
W2LXO		26			83	2
W2MEU	38				164	5
W2MGU		71			296	3
W2MPA	23				92	4
W2MQF		30			123	2
W1MUX/2	10	10			63	3
W3ABS	42				173	5
W3ACC	66				389	9
W3AXU	53	13			261	8
W3BZJ		58			306	3
W3CGV	53	4			297	6
W3GJU	26				67	4
W3HOH	43	55			377	7
W3IIS	26				189	7
W4FBH	7				34	3
W5DNN	1				1	1
W5FSC	4				46	2
W5VV	4				31	2
W6ANN	20	47			324	1
W6IOJ	16	24	1	1	213	1
W6OVK	10	1			180	3
W6QG	24				163	2
W6QKM	4	35	1		151	1
W6QLZ	8	3			162	2
W6RVL		102			379	1
W7CIL	8				83	2
W7RT		2			9	1
W8CIR *	52	10			908	10
W8KKD	32	32			305	5
W8PKJ	11				75	4
W8QOS	8				37	2
W8RUE	24	3			190	5
W8TDJ	12				125	3
W8UUY		7			68	1
W9AB	2				16	1
W9ANH	8				169	2
W9ARN	23				285	5
W9BDL	17				228	3
W9FHS	2	1	1		17	1
W9LLM		12			42	1
W9PNV		50			302	2
W9RLA		21			72	2
W9UNS	9				137	5
W9YKK	9				202	4
W9ZHL	14				190	2
W9ZJB	6				41	3

¹ Not eligible for award.

* The fine showing of W8CIR in the aurora session of March 30th ran his monthly total up to 504 points — a sure winner for the third period.

Starting with this issue, stations not reporting for two consecutive months will be omitted. These will be re-listed upon receipt of further reports.

U.H.F. RECORDS

Two-Way Work

- 56 Mc.: W1EYM-W6DNS, July 22, 1938 — 2500 miles.
112 Mc.: W6BJI/6-W6KIN/6, July 4, 1940 — 255 miles.
224 Mc.: W6IOJ/6-W6LFN/6, Aug. 18, 1940 — 135 miles.
400 Mc.: W6IOJ/6-W6LFN/6, Jan. 28, 1941 — 20 miles.

troveray is getting hotter, with several of the boys working on horizontal arrays. This appears to be another instance of needing one of each — or an array which can be used in either position.

W9ZHL, Terre Haute, is working on an emergency rig to go with his 500-watt 110-volt generator so that he can pile the whole business into the car and go out and operate a 56-mc. field station, should the need arise. The Ultra-Highs are the ideal field for this sort of work. With no QRM problem, and the ability to cover a wide local area under any and all conditions, gear for 56 and 112 Mc. should be a part of every emergency setup.

A new Indiana station, reported by W9ANH, is W9HUV at Lafayette. Bob is ideally situated for contact with the Northern Indiana stations, as well as with the fellows in Illinois who are frequently out of reach of the boys in Terre Haute and Marshall. He may be found on 56,064, c.w. only, at present. W9CNJ (he of the "Q" array atop the gas tank) is now located at Kirksville, Mo. He should help to make things interesting for W9ZJB and W9YKX. Some other new ones (reported by W9ARN) are W9PK, Lyons, W9AKF, Elmhurst, Ill., and W9UTZ, Lisbon, Iowa.

W9YKX, Woodbine, Iowa, continues successfully the 200 and 235-mile skeds with W9ZJB and W9NFM. Bill has also worked W9UTZ in Lisbon, another 235-mile hop. Skeds with W9USI at Brookings, S. Dak., were interrupted by the loss of the latter's 4-element array in high winds.

W9LLM, Downers Grove, Ill., also lost his 56 and 112-Mc. arrays in high winds early in the month. In their place he erected a 5-element $\frac{1}{4}$ -wave spaced array for Five, but finds this beam "too sharp for comfort," and is considering replacing it with a 3-element job. Frank may be found on 57,072, running 150 watts to a 35T. Higher power with a 250TH is forthcoming.

112 MC. AND UP

WANTED: Operators in the East to have a try at breaking the 112-Mc. DX record of 255 miles now held (along with all the other records) by W6's. With some of the fine spots available to portable enthusiasts along the Atlantic Seaboard, it should not be impossible to better this record during the favorable conditions of summer. Among the W1's who would like to try is W1JLI, Dedham, Mass., who would take gear to the top of Mt. Wachusett, Princeton, Mass., or Pack Monadnock, near Peterboro, N. H., for a try with some ambitious W3 who could get up on some high spot in Eastern Pennsylvania. W3BZJ, W3BYF — how about it?

We have word from Bob Paine, W1MHW, that the boys at Bowdoin College are getting set for $2\frac{1}{2}$. The favorable situation of Brunswick, on the Maine Coast with an over-water path to Boston, should make W1OR a nice DX shot for the gang in Eastern Massachusetts and Rhode Island.

More 112-Mc. emergency organization is reported by W6SRH. In cooperation with the AEC and the Santa Monica Sea Scouts, an Emergency Net has been formed in the Bay District. The first workout was held on April 6th, with W6OJQ operating from Point Dume, aided by W6SRH. W6RWQ operated aboard the 35-foot officer's gig, *Buccaneer*, with W6RUF standing by. W6SQO, stationed at the lighthouse on Santa Monica Pier contacted stations throughout the Los Angeles Area, as well as W6LQM who

was operating from Mt. Palomar. Rigs used were all 7A4-7C5 transceivers, similarly designed, operating from emergency power supplies. Another "mobilization" is planned which will include a trip to Catalina Island.

W6QKM reports that he is now portable-marine, as well as portable-mobile. Don has a small rig, also a 7A4-7C5 transceiver, aboard his 38-foot cruiser and is exploring the possibilities of $2\frac{1}{2}$ over water in trips to Catalina Island and other points. Don's present problem is to get an antenna high enough above water to really "get out."

You wouldn't expect to work out on any low-frequency band with a fraction of a watt of output and a hay-wire indoor antenna — why expect that it will be any different on the u.h.f. bands? W9RLA reports that many newcomers around Chicago (and wherever there is u.h.f. activity, we add) go on $2\frac{1}{2}$ with a midget transceiver and an inefficient antenna and give up in disgust after a few unsuccessful nights on the band. This is no argument against low power and simple equipment — wonders have been worked with this sort of gear — but the antenna must have what it takes! Get that skywire up in the air, and take some pains to see that it is working efficiently if you expect to work farther than you can see on any u.h.f. band!

$2\frac{1}{2}$ was acting up during Sunday afternoon, April 20th, according to W9PNV, Riverside, Ill. Some local stations developed a rapid fade and intermittent voice and m.c.w. sigs were heard. George goes on to say that horizontal antennas are being tried out by some of the "South Side" gang. This may be a clue to the fading condition, as flutter fades and other peculiarities are frequently noted on 56-Mc. sigs within local range when there is a mixture of polarization, especially when sigs are coming in from the back or sides of a directional array.

W9INI, Pleasant Hill, Mo., is having nice results on $2\frac{1}{2}$ with a single 800 at 76 watts input. The antenna is a 6-element multi-wire beam. Harry works with W9ZD and W9DDX in Kansas City and W9GK of Overland Park, Kansas. W9INI and W9DDX have both been heard as far west as Leavenworth, Kansas, a distance of 53 miles.

For a long time we've been hearing talk of going on 224 Mc. by various operators around Philadelphia, but it took W3VX to break the ice. First contact was with W3CUD, Collingswood, N. J., with the latter on Five. This was on March 30th. On April 4th, W3CFG of Philadelphia heard VX, who is at Audubon, N. J., a distance of 11 miles. W3GGC, 12 miles away, also hears VX. Contacts two-way await the completion of rigs at GGC and CFG. W3GNA, Abington, Pa., W3DI, Philadelphia, and W3HDI, Delanco, N. J., are other 56-Mc. men who are likely prospects. The rig used by W3VX is an 834 in a "Peterson Pot."

U.H.F. KINK OF THE MONTH

MANY fellows have discovered that fluorescent lights which are defunct for 110-volt operation make excellent substitutes for neon-bulbs — but have you tried them as standing-wave indicators? The 40-watt units, which can be obtained from your friends who work in factories or offices where they are in use, are 4 feet long. They light with much less "soup" than the ordinary neon; and, being entirely glass, they present no detuning effect when moved along a feed-line. The length of the illuminated portion serves as a very sensitive indication of the presence of standing waves. They're fine for tuning-up operations of any kind — and they have the decided advantage that their length permits the operator's hands to be well-removed from any "hot stuff" — a real safety feature.

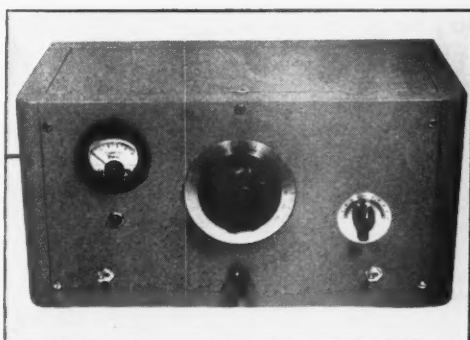
Strays

U. S. CITIZEN-STATIONS IN P. I.

Under F.C.C. Order No. 72, U. S. amateurs may contact only those KA stations licensed to U. S. citizens. The P. I. stations listed below may be worked without fear of violating Order 72. We strongly urge all U. S. amateurs to refer to this list before calling any KA stations: KA1AB, KA1AC, KA1AK, KA1AQ, KA1AR, KA1BB, KA1BN, KA1CM, KA1CO, KA1CW, KA1DM, KA1FA, KA1GC, KA1GH, KA1JH, KA1JJ, KA1MA, KA1ME, KA1NF, KA1RX, KA1WJ, KA1YL, KA4LH, KA7FS, KA7HB, KA8AA.

The performance of an e.c.o. is at least as much in the construction as in the circuit. Here's a frequency-control unit which combines a circuit novelty or two with interesting constructional features. It has had a thorough "air test" and come through with flying colors.

A compact and businesslike instrument having output on 80, 40, and 20 meters. Complete, including power supply, it measures only 8 by 16 by 8 inches.



A Transmitter Frequency Control Unit with Three-Band Output

A Self-Contained Cabinet-Type Exciter or Low-Power Transmitter

BY G. W. SHUART,* W2AMN

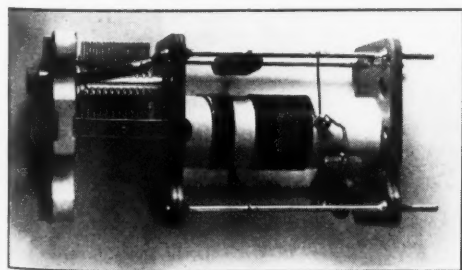
THE variable-frequency oscillator, while not new by any means, has really only begun to come into its own within the last year or two. We shudder to think of the amateur bands eventually cluttered up with thousands of e.c.o.'s or v.f.o.'s darting back and forth like a bunch of sizzlers in an aerial fireworks display; while the v.f.o. is a swell piece of apparatus, it requires some careful and prudent use. Undoubtedly, before the evil of these instruments manifests itself, plenty will be written to overcome the problem. In the meantime we have found in the v.f.o. something that can never be replaced by any other instrument. The particular v.f.o. to be described is an e.c.o. It seems that the type of circuit used is not so important as the physical arrangement and general mechanical design. Before we get into the

details of construction, let's see what makes this v.f.o. different from others.

In its design, a definite effort was made to keep it simple to build and operate. Only one control is operated during normal use and output is available on three bands — 80, 40 and 20 — by changing only the output coil. Although plug-in coils are used, band-switching could be employed without difficulty. Also, the tuned circuit could be arranged to cover two bands with one coil so that only two coils would be necessary for complete coverage. The entire design of this unit is simplified by the use of only a single tuning condenser. Usually three-gang condensers are employed in this type of instrument.

The Oscillator

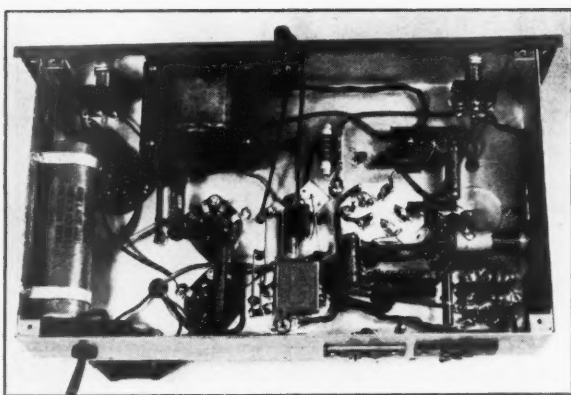
The electron-coupled oscillator operates in the 160-meter band and covers 1750 to 2000 kc. The tuned circuit is a self-contained unit and includes everything but the main frequency-changing condenser. The mechanical arrangement of this unit provides excellent stability and freedom from frequency changes caused by vibration or shock. This e.c.o. doesn't have to be operated on sponge rubber pads. As a matter of actual fact, there is only slight modulation, and that from tube element vibration, when the instrument is subjected to mechanical shock. As shown in the photograph four vertical bars hold the entire oscillator assembly together, and these also serve as terminals for external connections. One goes directly to the



Inside the oscillator tuned circuit assembly. The stiff wires at the corners serve both as supports and terminals.

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On the extreme right can be seen the permeability tuned coil which provides excitation for the output stage on 80, 40 and 20 meters. This coil is mounted under the chassis so there will be no coupling between it and the output circuit.

grid of the 6SJ7 tube, a second to the cathode, one to the B-negative and the last to the tuning condenser.

Keying in the oscillator circuit is accomplished by breaking the negative lead. A simple filter consisting of a small r.f. choke and a 0.005- μ fd.

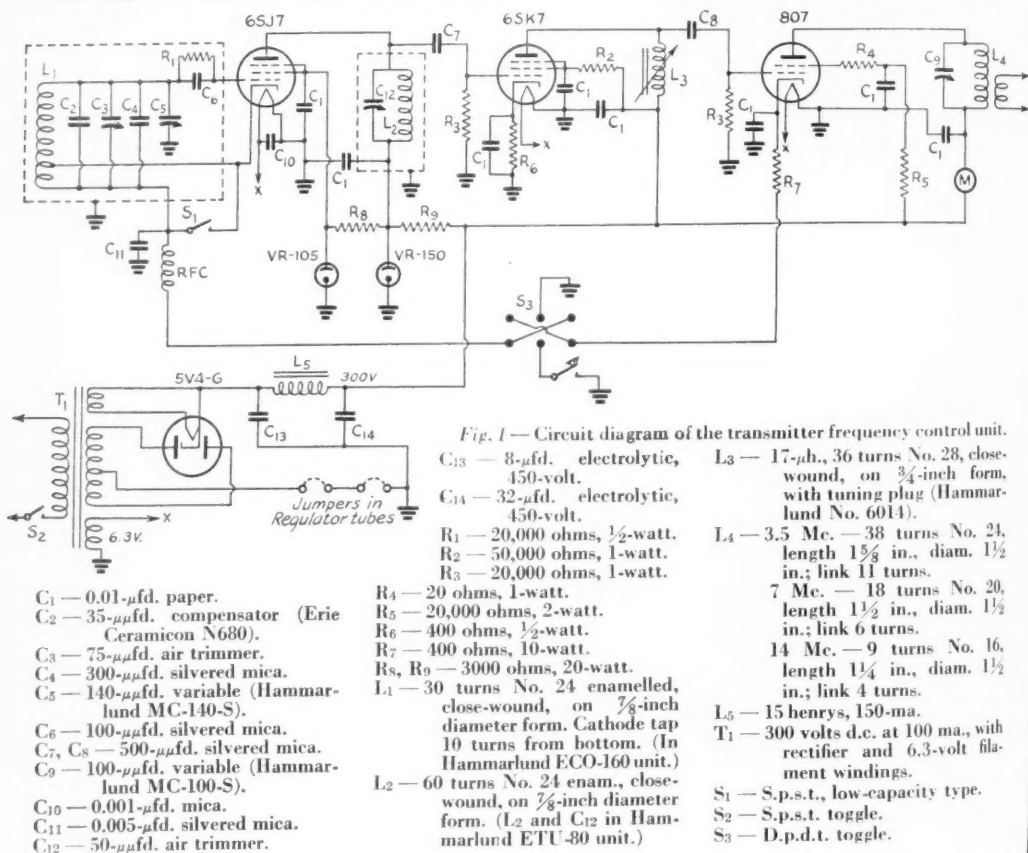
silvered mica condenser removes all traces of r.f. and permits clean keying.

The voltages to the plate and screen grid of the 6SJ7 are regulated, the screen by a VR-105 and the plate by a VR-150. The screen voltage, being more critical, has compound regulation and consequently a high degree of voltage stability is obtained. The 6SJ7 proved to be the best tube for the purpose since very little output was required. In this particular case connecting the screen and suppressor together proved beneficial.

The output of the oscillator is tuned to 3550 kc. with a fixed tank circuit. Unless the entire unit is to be operated in the high-frequency portion of the 80-meter c.w. band, or the 75-meter 'phone band, this circuit will require no adjustment. Tuning it to 3550 kc. permits operation over a very wide portion of the c.w. band and all of the 40- and 20-meter bands.

Buffer Multiplier

The second tube in the line-up is a 6SK7, operated as a fixed-tune amplifier-doubler. Its plate



circuit is resonated to 7050 kc. with a permeability-tuned coil. Once set, this coil requires no adjustment regardless of the output frequency.

It may seem unusual to tune this circuit to 7050 kc. and expect the amplifier which follows to operate in the 3.5-Mc. band, but that is exactly what happens. The 807 can be operated in the 80-meter band with efficiency as great as if not greater than that obtained when it is operated in the 20-meter band as a doubler. Sufficient r.f. excitation gets by L_3 to make the amplifier work efficiently over the complete 80-meter band. The 807, of course, is a straight amplifier on 7 Mc.

Output Stage

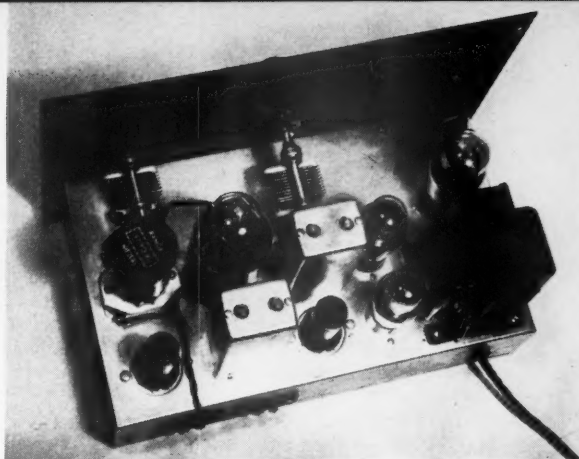
The output of the 807 is relatively constant over any one band and is approximately the same on all three. A careful check of the 807 grid current showed that ample excitation was present at any frequency in the 40- or 20-meter bands and over two-thirds of the 80-meter c.w. band. For maximum output in the high-frequency portion of the 80-meter c.w. band, or the 'phone band, it is necessary to make a slight adjustment of the oscillator output circuit.

The amplifier plate circuit when loaded to the normal 60 ma. by an antenna or another amplifier requires no adjustment over an extremely wide range of frequency, although a separate control is available on the panel to touch up this circuit when necessary. The plate current of the 807 is a fairly good indication of how the rest of the outfit is working. A 0-100 milliammeter is connected permanently in this circuit.

Returning to L_3 , the permeability-tuned coil, we would like to point out that slight changes in value might disrupt the operation of the entire unit. For example, in one unit built up experimentally it was desired to increase the excitation for the 807. On the assumption that the grid leak, R_3 , was absorbing some of the output of the 6SK7, an r.f. choke was placed in series with the leak. The excitation went up on 40 and 20 meters, but the circuit no longer passed sufficient r.f. at 3.5 Mc. to give satisfactory operation. Removing the choke permitted normal operation.

On 7 Mc. a tendency of the 807 to oscillate with the key open in oscillator keying was overcome by connecting a 20-ohm resistor in series with the screen.

Although not shown in the photograph, additional terminal strips have been made available to provide external grid bias — we believe this is a worthwhile addition, as it prevents oscillation



The oscillator tuning unit is directly behind the main tuning condenser located in the center of the panel. Note that the output link wires are run on the outside of the chassis to prevent coupling to the 6SK7 amplifier-multiplier.

in the amplifier when the oscillator is keyed — and to connect an external 600-volt plate supply for the 807 in cases where higher output is required.

While there may be no particular advantage in the key change-over arrangement, it was installed in this unit for test purposes so that the key could be switched from oscillator to amplifier under any particular set of conditions to determine whether or not keying of the oscillator was satisfactory at all times.

Frequency Drift

In an effort to make this unit compact, the power supply and all other equipment was built on the one chassis. Naturally, some particular conditions existed that may not exist in some other arrangement. For example, every experimental unit built up proved to have ample stability and low frequency drift, although there was occasionally hum modulation in the carrier and in some cases the keying was not clean. In all cases, it was found necessary to by-pass the oscillator heater right at the tube to clear up hum modulation and coupling between the input and output circuits. With the addition of this condenser, complete isolation was achieved. The output circuit can be tuned through resonance, loaded or unloaded, and there is absolutely no change in the oscillator frequency.

Frequency drift encountered in this particular unit was mostly caused by the heat radiated by the power transformer and rectifier tube. If the power supply were not contained in the cabinet, no drift compensation would be required, although the addition of drift compensation can

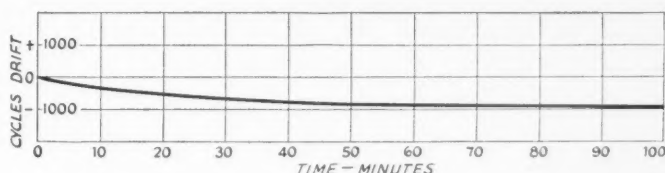


Fig. 2 — Drift characteristic of the oscillator unit, measured from a cold start. Frequency 3.5 Mc.

be an asset in any case. We found that with a $35\mu\text{fd}$. compensator the overall drift of the complete unit shown in the photograph was quite low. The accompanying curve gives the result of a careful laboratory check. It would be possible to use more compensation, but it was not deemed desirable because of the danger of overcompensation and a reversal of drift some time during operation. We are of the opinion that to have a known drift in a known direction is about the safest bet.

It is surprising how much more effective low power becomes when the frequency can be varied at will. We have been using this outfit just as shown with no additional amplification for a period of about four months at W2AMN. During that time practically the entire U. S. was worked and the performance was really remarkable. Of course it doesn't pay to call CQ with this sort of rig; our practice was to wait for a CQ, adjust the frequency of the oscillator to coincide with that of the other station, and then call when the CQ was finished. Contacts were numerous and operation appeared to be just as satisfactory as with any 200- or 300-watt rig we ever operated. All this took place in the 40-meter band, which is pretty crowded at the present time.

Normally, the amplifier is keyed. This permits the "quiet" switch, S_1 , to be used for frequency setting. The oscillator can be turned on and the signal checked in the receiver without radiation from the transmitting antenna. Thus a lot of unnecessary disturbance is prevented. Every v.f.o. should have some arrangement by which the oscillator can be turned on and operated independently of the output amplifier so it will not cause interference during adjustments. Finding a place for the "quiet" switch seemed, at first, to be quite a problem. However, a low-capacity switch connected between the cathode and the negative return of the tuned circuit killed the oscillator and permitted everything else to remain the same in the circuit insofar as current and tube temperature were concerned. One word of warning — the leads to this switch should be very short because if there is appreciable inductance in the switch circuit the oscillator will operate even though the switch is closed. If the mechanical layout demands that the oscillator tuning unit be mounted a considerable distance from the panel the switch should be operated by an extension shaft.

No effort was made to calibrate the oscillator since it was operated in conjunction with a calibrated receiver. However, we would suggest calibrating it and providing some means of checking it periodically. Our tests have shown that a unit of this type, if carefully designed and constructed, will remain in calibration indefinitely, but as a matter of precaution, even though its calibration can be relied upon the oscillator frequency should be checked in the receiver before transmission is attempted.

WWV Schedules

IMMEDIATELY after the standard frequency station WWV of the National Bureau of Standards was destroyed by fire November 6th last, a temporary transmitter was established in another building and partial service was begun. The service has now been extended, although still with temporary equipment. It is on the air continuously at all times day and night, and carries the standard musical pitch and other features. The radio frequency is 5 megacycles per second.

The standard musical pitch carried by the broadcast is the frequency 440 cycles per second, corresponding to *A* above middle *C*. In addition there is a pulse every second, heard as a faint tick each second when listening to the 440 cycles. The pulse lasts 0.005 second, and provides an accurate time interval for purposes of physical measurements.

The 440-cycle tone is interrupted every five minutes for one minute in order to give the station announcement and to provide an interval for the checking of radio measurements based on the standard radio frequency. The announcement is the call letters (WWV) in telegraphic code.

The accuracy of the 5-megacycle frequency, and of the 440-cycle standard pitch as transmitted, is better than a part in 10,000,000. The time interval marked by the pulse every second is accurate to 0.000,01 second. The 1-minute, 4-minute, and 5-minute intervals marked by the beginning and ending of the announcement periods are accurate to a part in 10,000,000. The beginnings of the announcement periods are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods; this adjustment does not have the extreme accuracy of the time intervals, but is within a small fraction of a second.

★ NEW APPARATUS ★

NEW CODE PRACTICE OSCILLATOR

A NOVELTY in code-practice oscillators is introduced by Airadio, Inc., 2 Selleck St., Stamford, Conn. The unit consists of a compact crystal r.f. oscillator whose signal may be picked up on the station receiver. Output on any amateur-band frequency may be obtained by plugging in appropriate crystal and plate coil. An adjustable antenna coupling condenser and resonance indicator are provided so that the unit may be used as a transmitter with an output of 1.5 watts.

Tube, crystal, coil and key are included in the unit which operates directly from standard 115-volt a.c. or d.c. lines.

Eleventh A.R.R.L. Sweepstakes Results

Scores Reach All-time High—Three Operators Top 100,000 Points!

BY J. A. MOSKEY,* WJMY

PERHAPS the best thing that may be said of the Eleventh ARRL Sweepstakes Contest held during two week-ends last November is that enthusiasm was probably at a higher pitch than in any amateur radio operating competition of recent years. Space does not permit us to quote the numerous expressions of approval voiced by the contest-minded fellows (and gals too!) who spent many hours of enjoyable participation in an SS highlighted by shattered records and new accomplishments. However, the figures speak for themselves. Look at those scores! Bigger than ever, they represent skill in operating attained only by that characteristic determination of the radio amateur to get the most out of what he has to work with.

1388 entries were received from participants who submitted 1114 c.w. logs and 274 'phone logs. The extent to which performances of past years were bettered is indicated in the observation that 42 c.w. operators made final scores of more than 70,000 points as against 27 in the 1939 shindig. Among the 'phones, 27 totals over 20,000 were received compared with 21 in the previous SS.

Winners

All of the League's 64 active Sections were represented in this Sweepstakes. Handsome certificate awards are being made to 64 c.w. operators and to 59 of the 'phone gang. A list of the winners in each of the classifications is included in this report along with as much information as we have available on transmitter line-ups, type frequency control employed, receivers, and bands used. Making for greater flexibility in operation and the ability to snare those rare sections by sliding right up alongside, the use of variable frequency

oscillator rigs seems to have been a "must" in the majority of cases where outstanding scores were piled up by leading SS'ers. With competition becoming much keener each year, contest hounds must keep right on their toes to stay in the running these days. The winners in the Eleventh ARRL Sweepstakes certainly had plenty of "what it takes." To them we extend hearty congratulations. Nifty going, gang!

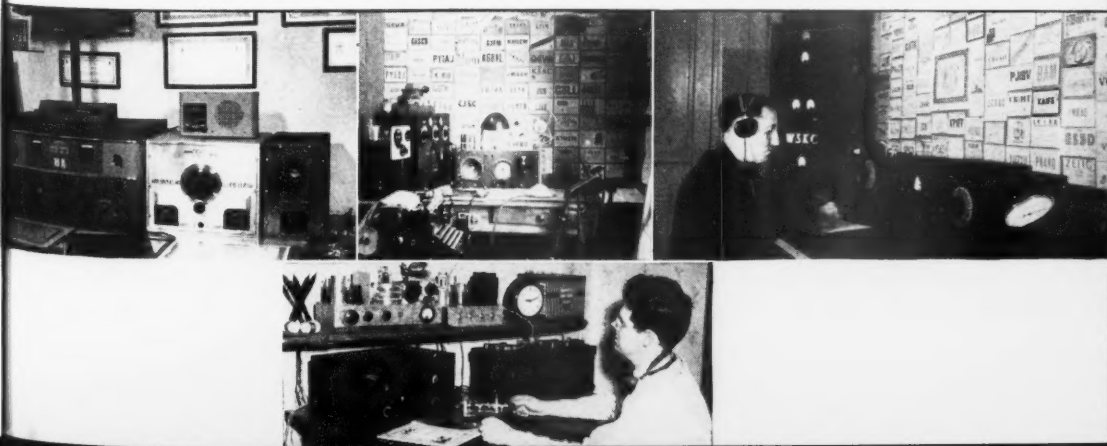
Leading C.W. Scorers

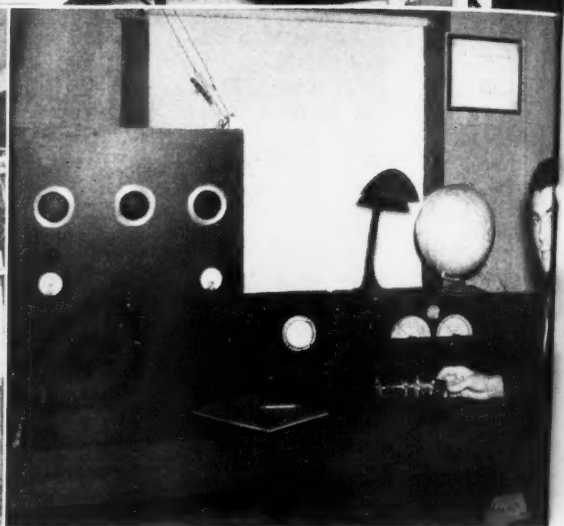
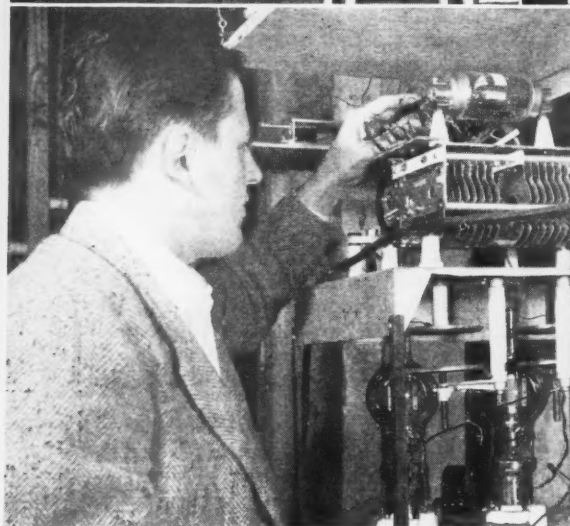
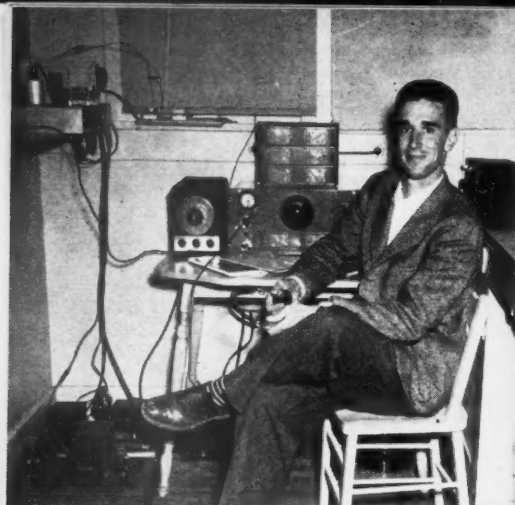
That man Mathis did it again! Yep, W3BES went over the top to the tune of 113,848 and set an all-time high by working 737 stations (No, that's no printer's error. We said 737!) in 62 sections. We're still staying awake nights trying to figure out how he does it! Some people say he just isn't human, but the cold figures tell the story. It must be that his efficiency is about 99.9%. At any rate, Jerry deserves a mighty big hand for a piece of operating we don't have adjectives powerful enough to describe!! Trailing along behind W3BES we find that old SS veteran, W9FS, with a fancy 108,963 points, amassed by contacting 703 stations in 62 sections. We note Bert also took second place in the previous contest and is apparently set on letting nothing budge him from that enviable position. Congrats, Mistuh Brown. Following hot on the trail of W9FS, we find W8JIN also in the six-digit bracket. Operator James W. Ringland took third place with 107,803 — an even 700 contacts with 62 sections.

Following the "big three" with scores over 70,000 were W2GSA, 97,417; W2IOP, 97,350; W3DGM, 93,930; W8HGW, 92,110; W9BRD, 89,365; W9VDY, 88,988; W2HHF, 88,970; W6QAP, 88,273; W9RQM, 88,195; W8OKC, 87,885; W9ASO, 87,653; W1TS, 87,575; W8NLQ,

*Asst. to the Communications Mgr.

Upper left: W2IOP, N.Y.C.-L.I. c.w. winner. Upper center: W9BRD, Illinois c.w. winner. Upper right: W5KC, La. c.w. winner. Lower center: W3BES, national high scorer, holder all-time SS record and Frankford R.C. gavel!





Upper left: W6QAP, Arizona c.w. winner. Upper right: W9FS, Ky. c.w. winner, second national high scorer. Lower left: W6HJT, Santa Clara Valley c.w. winner. Lower right: W2GSA, N. N. J. c.w. winner.

85,845; W9ZRP, 84,785; W6ITY, 84,420; W6IDZ, 83,223; W6PCE, 82,373; W3GHM, 82,045; W5KC, 81,763; W6IOJ, 81,763; W9YFV, 81,750; W2JAE, 81,554; W3GKO, 80,700; W9CRK, 80,600; W3HFD, 80,314; W9DIR, 78,908; W1RY, 77,165; W9VKF/9, 77,035; W6NIK, 76,415; W9CWW, 75,020; W9UTB, 73,588; W8KUN, 73,316; W3IWM, 73,200; W9YCR, 73,160; W5AAN, 72,600; W9ERU, 72,198; W3EEW, 71,920; W9GFF, 71,700; W6HJT, 71,631; W5WG, 71,025; W9MUX, 70,615; W2MEL, 70,395.

Leading the parade in number of contacts was W3BES with 737 QSO's — an average of 18.4 per hour. This is an unprecedented record and represents some pretty fast stepping! Also above 700 were W9FS, 703 (17.5 per hour), and W8JIN, 700. In the 600-or-over class we find W2IOP, 672; W6IDZ, 663; W2GSA, 631; W2JAE, 618; W3DGM, 607; W8HGW, 604; W8OKC, 600. Twenty-eight other stations turned in logs showing 500 or more contacts.

Sections Worked

The banner for working all sections goes this time to a 'phone participant. Paul Edwards, W9NDA, worked 'em all, the only entrant to do so. FB and congratulations, OM.

All but one section was snagged by W6ITH on 'phone, and on c.w. by W2MAP, W2ZA, W3AGV, W6HJT, W6IDZ (W6HZT opr.), W6ITY, W6PCE, W8GD, W8IFT, W9DIR, W9ERU, W9VDY.

Each of the following worked 62 sections on c.w. — W1TS, W2GSA, W2HHF, W3BES, W3DGM, W3EEW, W3FRY, W5KC, W6IOJ, W6NIK, W6QAP, W8BTI, W8JIN, W8SFF, W9ASO, W9BQJ, W9CRK, W9CWW, W9FS, W9GY, W9RQM, W9VKF/9, W9YCR, W9YWQ (W9UUM opr.), and W9ZRP. In most cases the sections missed were P. I. and Vermont.

'Phone Highs

W6ITH remains on top for the fifth consecutive year as high SS 'phone man with a total of

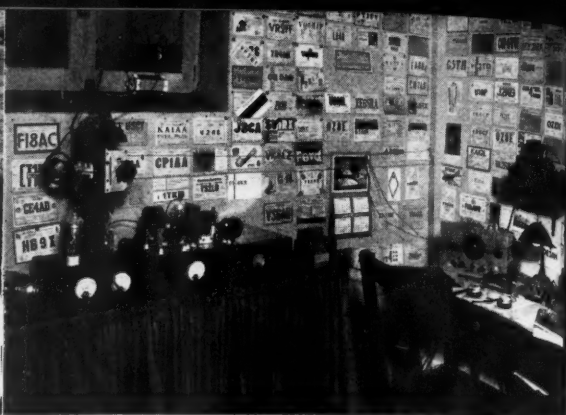
WINNERS, ELEVENTH A.R.R.L. SWEEPSTAKES CONTEST

Radiotelegraph

Section	Winner	Call	Transmitter Line-Up	Type Osc. (E.C.O. or C.C.)	Receiver	Bands Used
E. Penna.	Gerry Mathis	W3BES	6SK7-6V6-807-812's	e.c.o.	NC101X	3.5, 7, 14
Md.-Del.-D. C.	Arthur Q. Tool, Jr.	W3FQZ	6L6G-807-809's; 6L6-807-811	Both	—	3.5, 7
N. J.	Grier Miller	W3FXV	42-807	e.c.	Sky Champion	3.5, 7, 14
N. New York	Francis G. Miller	W8DZC	6SK7-6V6-6L6-T40	e.c.o.	NC101X	3.5, 7, 14
W. Penna.	W. B. Thompson	W8OKC	89-802-807-TZ40	e.c.o.	SX16	3.5, 7, 14
Illinois	Rodney Newkirk	W9BRD	24A-6L6-HY6L6GX's	e.c.o.	7-tube super	3.5, 7, 14
Indiana	Ray Miles	W9KBL	6SK7-6V6-6L6-T40	e.c.o.	Sky Challenger	3.5, 7
Kentucky	Bert Brown	W9FS	6V6-807-813	e.c.o.	RME69 & DB20	3.5, 7, 14
Michigan	Theodore Gersten	W8JVI	6V6-6L6-807's	e.c.o.	Sky Challenger	3.5, 7, 14
Ohio	James W. Ringland	W8JIN	E.c.o.-6L6-807-HK54	e.c.o.	HQ120X	3.5, 7, 14
Wisconsin	R. C. Schmidt	W9VDY	E.c.o.-807-35T	e.c.o.	Superhet	3.5, 7, 14
No. Dakota	Carlyle R. Norman	W9ZOU	Meissner Signal Shifter-HK54's	e.c.o.	SX23	7, 14
So. Dakota	Paul Range	W9GCW	6N7-6L6G's	v.f.o.	—	—
No. Minn.	C. William Davies	W9YCR	6SK7-6SJ7-807-808	e.c.o.	RME9D	3.5, 7, 14
So. Minn.	L. A. Morrow	W9VKF	6K7-6L6-6L6-6L6-814	e.c.o.	HQ120X	3.5, 7, 14
Arkansas	Lester Wooley	W5EIJ	47-16's	e.c.	SX24	—
Louisiana	Vincent L. Rosso	W5KC	E.c.o.-NTX30-100TH	e.c.o.	NC101X	3.5, 7, 14
Mississippi	Fred L. Ford	W5AVF	6L6-6L6's	e.c.	NC81X & pre.	7, 14
Tennessee	M. N. McCoy	W4FCF	—	—	—	—
E. New York	Elbert L. Taylor	W2EWD	47-47-809-809's	e.c.	Sky Chief	3.5, 7, 14
N. Y. C. & L. I.	Larry LeKashman	W2IOP	Meissner Signal Shifter-814	e.c.o.	AR77	3.5, 7, 14
N. N. J.	Bob Morris	W2GSA	Meissner Signal Shifter-803	e.c.o.	—	3.5, 7, 14
Iowa	J. H. Buck	W9ZDS	6SK7-6V6-RK39-HK24	e.c.o.	10-tube super	7, 14
Kansas	Charles A. Pine	W9CWW	802-807-814	Both	NC101X	7, 14
Missouri	Clarence L. Arundale	W9GBJ	2A5-2A5's-T20-35T	e.c.	SX16	7, 14
Nebraska	Charles L. Hansen	W9ASO	6SK7-6L6-100TH	e.c.o.	NC100X	7, 14
Conn.	E. R. Fraser	W1KQY	Meissner Signal Shifter-809's	e.c.o.	NC101X	3.5, 7, 14
Maine	Ernest L. Bracy, Jr.	W1BFA	6L6-6F6-807-HF100's; 6L6-6L6-TZ40	Both	NC101X	3.5, 7, 14
E. Mass.	Roger F. Hathaway	W1RY	59-6L6-808	—	HRO	3.5, 7, 14, 28
W. Mass.	Ernest E. Curry	W1KZS	6L6G-812	e.c.	SX17	3.5, 7
N. H.	Dorothy W. Evans	W1FTJ	HY61-RK47	e.c.	—	—
R. I.	Raymond A. Hurlburt	W1LWA	6SK7-807-809	e.c.o.	Sky Chief	3.5, 7, 14
Alaska	Arthur B. McBride	K7GOM	802-809	e.c.	RME69	7, 14
Idaho	Richard W. Mickey	W7IUY	6L6-807	e.c.	NC44	7, 14
Montana	Elmer Briden	W7BSU	—	e.c.o.	—	3.5, 7, 14, 28
Oregon	Ermund A. Zochert, Jr.	W7ECI	802/6J5-807-T40's	Both	—	3.5, 7, 14
Washington	John Gruble	W7RT	Meissner Signal Shifter-811	e.c.o.	NC101X	7, 14
Hawaii	Katashi Nose	K6CGK	E.c.o.-HK54	e.c.o.	FB7 & pre.	7, 14
Nevada	Dana D. Little	W6RWX	6L6-807-TZ40	—	—	3.5, 7, 14
Santa Clara V.	Cameron G. Pierce	W6HJT	6SK7-6V6-6N7-6N7-813	e.c.o.	—	3.5, 7, 14
East Bay	John Woerner	W6ONQ	—	—	—	3.5, 7, 14
San Francisco	H. G. Loretz	W6GWW	6K7-6V6-807-50T-HK354	Both	Comet Pro	7, 14
Sacramento V.	Orion M. Arnold	W6PAR	RK39-HK54	Both	RME69	3.5, 7, 14
Philippines	L. A. Mason	K1AK	—	—	—	7, 14
San Joaquin V.	Myron E. Ferguson	W6PYG	58-6F6G-6F6G-6L6G's	e.c.o.	7 tube super	7, 14
No. Carolina	William A. White	W4ERG	41-41-6L6G	e.c.	—	3.5, 7, 14
So. Carolina	Gus Browning	W4BPD	860; 852; 150T	—	—	3.5, 7, 14
Virginia	W. R. Shuler	W3IWM	6SK7-6L6-807-HY51Z	e.c.o.	—	3.5, 7, 14
West Va.	Hobart Burkhamer	W8KWI	V.f.o.-807-T55	v.f.o.	PR15	3.5, 7, 14
Colorado	E. F. Miller	W9WTW	E.c.o.-6L6-809's-T55's	e.c.o.	—	3.5, 7, 14
Utah-Wyo.	Everett E. Young	W7HMQ	6L6-6L6's	e.c.	SX25	3.5, 7, 14
Alabama	Nelson S. Brooks	W4EDJ	6L6-807; 6L6-RK39-T55	e.c.o.	SX25	7, 14

Left: W8JIN, Ohio c.w. winner, third national high scorer. Right: W8OKC, W. Pa. c.w. winner.





Left: W9VDY, Wisconsin c.w. winner. Right: W9ASO, Nebraska c.w. winner.

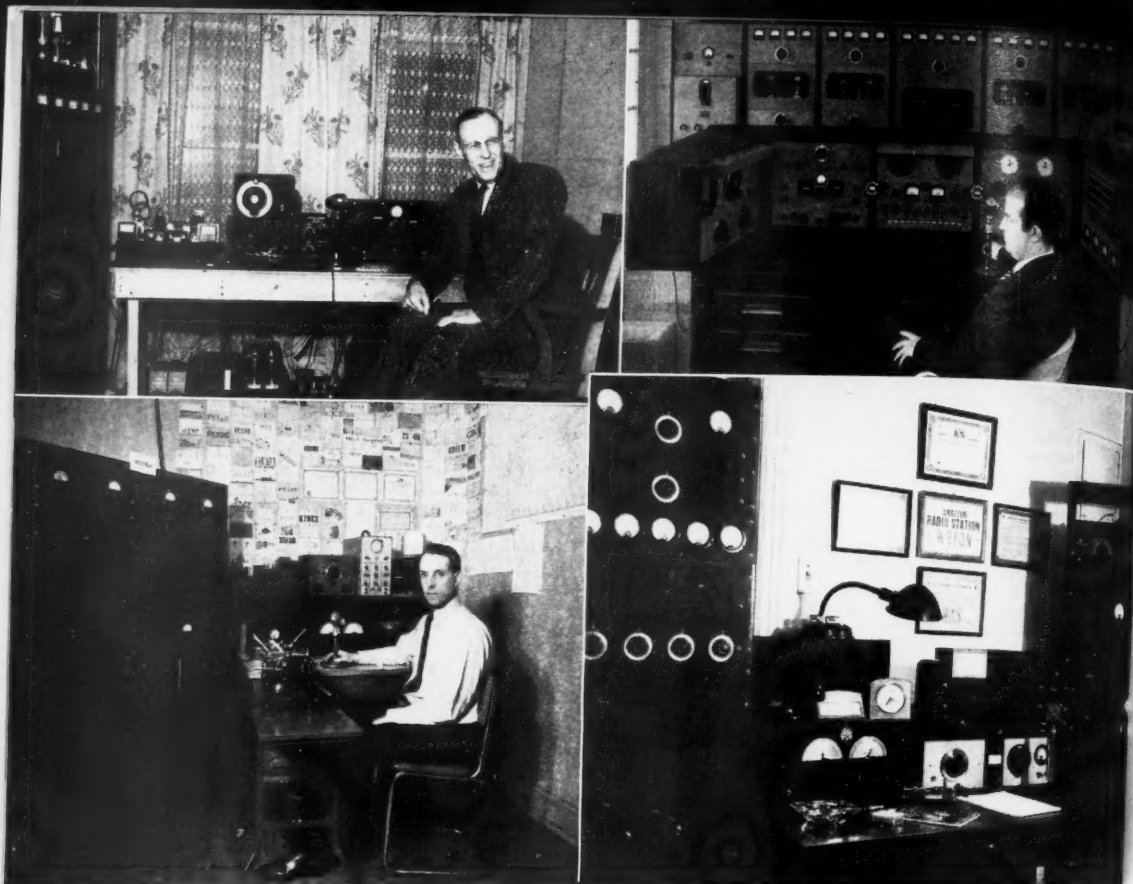
Section	Winner	Call	Transmitter Line-Up	Type Osc. (E.C.O. or C.C.)	Receiver	Bands Used
E. Florida	Paul L. Burgess, Jr.	W4ERU	6L6-6L6-809-HY40Z's	e.c.o.	—	3.5, 7, 14
W. Florida	George S. Eggart, Jr.	W4EPT	6F6-T55; 6F6-6L6-807's	e.c.o.	NC101X	3.5, 7, 14
Georgia	Reginald R. Cain, Jr.	W4CYC/4	6SK7-6V6G-6L6-807-TZ40	e.c.o.	—	3.5, 7, 14
West Indies	Kenneth P. Billings	W2NBP/K4	Meissner Signal Shifter-6L6-HK54	e.c.o.	NC101X	14
Los Angeles	Stanley Carr	W6IDZ	E.c.o.-HK24-HK54-HK254's- HK354's	e.c.o.	—	7, 14
Arizona	Bud Keller	W6QAP	X-E.C.-807-35T	e.c.o.	NC101X	7, 14
San Diego	R. Apostle	W6ITY	36-42-6L6-T20-852	e.c.o.	Super	7, 14
No. Texas	C. W. Tittle	W5AAN	Meissner Signal Shifter-35T	e.c.o.	—	3.5, 14
Oklahoma	Lyle M. Smithers	W5LW	802-807-100TH	e.c.o.	Howard 437	3.5, 7, 14
So. Texas	Bruno M. Wojcik	W5CWW	6F6-6L6-807-T125	e.c.o.	HRO	7, 14
New Mexico	Sheldon H. Dike	W5HAG	6L6-HK24	e.c.	—	7, 14

CLUB SCORES

Club	Score	C.W. Winner	Phone Winner
Frankford Radio Club (Phila.)	1,028,787	W3BES	—
Greater Cincinnati Amateur Radio Ass'n.	936,752	W9FS	W8NDN
Milwaukee Radio Amateurs' Club	442,917	W9VDY	W9ESJ
York Radio Club (Ill.)	332,937	W9YFV	W9NAB
New Haven Amateur Radio Ass'n (Conn.)	255,233	W1KQY	W1GDC
Northern Nassau Wireless Ass'n (N. Y.)	202,821	W2AYJ	W2HYJ
Cahokia Amateur Radio Club (Ill.)	192,625	W9GFF	W9OAW
Twin City Bug Twiddlers (Mpls.)	185,236	W9NCS	—
North Newark Amateur Radio Club (N. J.)	177,268	W2LXI	—
Westlake Amateur Radio Ass'n (Ohio)	170,822	W8HGW	—
Wisconsin Valley Radio Ass'n.	162,672	W9RQM	W9ZTO
Southtown Amateur Radio Ass'n (Chgo.)	151,514	W9MGN	—
Chester Radio Club (Pa.)	143,705	W3DGM	—
Columbia University Radio Club	141,368	W2HHF	—
Tri-Town Amateur Radio Club (Chgo.)	118,649	W9DUX	W9MWJ
Western Nebraska Radio Amateurs	108,987	W9MGV	W9KQX
Queens Radio Amateurs (N. Y.)	106,476	W2LPJ	W2LGS
Narragansett Ass'n of Amateur Radio Operators (R. I.)	104,889	W1LWA	—
Hi-Q Radio Club (Lynn, Mass.)	95,289	W1HY	W1HA
San Joaquin Radio Club (Calif.)	90,348	W6BYM	—
Stanford University Radio Club	87,126	W6HJT	W6YX
Dayton Amateur Radio Ass'n (Ohio)	84,974	W8CED	W8TPC
Maui Amateur Radio Club (Hawaii)	78,659	K6CGK	—
South Jersey Radio Ass'n (N. J.)	78,268	W3HDJ	—
York Road Radio Club (Phila.)	78,268	W3EEW	—
Elmira Amateur Radio Ass'n (N. Y.)	70,722	W8DZC	—
Cuyahoga Radio Ass'n (Ohio)	69,168	W8ROX	—
Parkway Radio Ass'n (Mass.)	64,500	W1MDV	W1INL
Central Illinois Amateur Radio Club	41,885	W9CEO	W9QWM
Hamfesters' Radio Club (Chgo.)	37,850	W9FAQ	—
Lowell Radio Operators Club (Mass.)	37,439	W1KMY	W1QM
Mike and Key Club of Santa Monica (Calif.)	34,414	W6VB	—
Advance Radio Club (La.)	31,948	W5HNV	W5IRO
Associated Amateur Radio Operators of Denver (Colo.)	31,293	W9CAA	W9BQO
Bridgeport Amateur Radio Ass'n (Conn.)	30,152	W1APA	—
Lebanon Valley Radio Ass'n (Pa.)	26,959	W3HZK	—
Providence Radio Ass'n (R. I.)	24,621	W1MEK	—
Dells Region Radio Club (Wis.)	24,000	W9RBI	W9HHR
Chair City Radio Club (Mass.)	12,474	W1DCH	—
Campus Radio Club (Idaho)	7,298	W7IY	W7FER
Starved Rock Radio Club (Ill.)	3,832	W9NGG	—

Radiotelephone

Section	Winner	Call	Transmitter Line-Up	Type Oac. (E.C.O. or C.C.)	Receiver	Bands Used
Md.-Del.-D. C.	Arthur W. Plummer	W3EQK	6J7-6L6-802-TZ40-HK254's	e.c.o.	SX23/DM36	3.9, 14, 28
S. N. J.	A. E. Williams	W3HDJ	810's	—	HQ120X	3.9, 14
W. N. Y.	Bruce L. Kelley	W8ACY	89-6F6-807	e.c.o.	Zenith	3.9
W. Penna.	Norman R. Gillin	W8HMJ	Meissner Signal Shifter-813-	—	—	—
Illinois	Paul L. Edwards	W9NDA	HK254's	e.c.o.	HQ120X	3.9, 14
Indiana	Russell M. Price	W9GWL	Meissner Signal Shifter-807-	—	—	—
Kentucky	W. E. Leatherman	W9YQN	HY312's	e.c.o.	S-20	1.75, 3.9
Michigan	Ralph Horian	W8EMP	802-807-807-T40's-T125's	e.c.o.	—	3.9, 14, 28
Ohio	Norman Holloway	W8QUL	50T's; 242A	e.c.	—	1.75, 3.9, 14
Wisconsin	C. E. Smith	W9ZTO	E.c.o.-807-HK254-HK354's;	—	—	—
No. Dakota	Don Beaudine	W9RPJ	e.c.o.-809's-100TH's	e.c.o.	—	3.9, 14
So. Dakota	Ernest C. Mohler	W9ADJ	Meissner Signal Shifter-807-35T-	—	—	—
No. Minn.	Marvin B. Millett	W9RIL	250TH's	e.c.o.	HRO	3.9, 14, 28
So. Minn.	R. G. Richardson	W9ZDM	HY60-6L6G's-RK47-T40's	e.c.o.	Silver 5D	3.9, 14, 28
Arkansas	Jessie J. Hart	W5HWK	6N7-6L6's-TZ40-T200; T21-T21-	—	—	—
Louisiana	Charles L. Kelley	W5IRO	TZ40-TZ40's	e.c.	—	1.75, 3.9, 14, 28
Tennessee	William R. Owens	W4DUS	6A6-807-TZ20-T55's	e.c.	—	3.9, 14
E. New York	Samuel P. Nixdorff	W2MEC	—	—	—	3.9
N. Y. C. & L. I.	George P. Maerkle	W2HAW	6N7G-807-809's	e.c.	—	1.75, 28
N. N. J.	James A. Wotton	W2JUJ	E.c.o.-T21-TZ40-T40-TW150	e.c.o.	HRO	1.75, 28
Iowa	Milton S. Miller	W9TJA	100TH's	—	—	3.9, 14
Kansas	George E. Jauss	W9PNX	6L6-T55-HK54-HK254's	e.c.	RME69	3.9
Missouri	Dow B. Summers	W9KOH	802-807-35T-100TH's	e.c.o.	HRO	3.9, 14, 28
Nebraska	Dean W. Hagemeister	W9KQX	Meissner Signal Shifter-6L6-812's	e.c.o.	HQ120X	3.9, 14, 28
Connecticut	Frederick M. Dingwall	W1GDC	Meissner Signal Shifter-T40-	—	—	—
Maine	Francis J. Gordon	W1LOA	TZ40's	e.c.o.	RME9d-RME510X	3.9, 14, 28
E. Mass.	Dana W. Atchley, Jr.	W1HKK	6L6-6L6-RK39's-RK63	e.c.	SX28	1.75, 28
W. Mass.	Albert H. LaFleur	W1MCF	6V6-6L6-807-852's	—	—	1.75, 3.9, 14, 28
N. H.	H. V. Cushing	W1HJI	6V6-6L6-807-T20's	Both	Comet Pro	3.9, 14
R. I.	Willard D. Cook	W1JFG	Meissner Signal Shifter-807-	—	—	3.9, 14, 28
Vermont	M. B. Forbes	W1KTB	100TH-RK38's	e.c.o.	HQ120X	1.75, 3.9, 14, 28
Alaska	James G. Sherry	K7GNN	6A6-T20-801's	e.c.	—	14
Idaho	J. V. Durant	W7FER	6F6-6L6-814	—	Howard 460	3.9, 14, 28
Montana	R. P. Roberts	W7CPY	6L6-6L6-T55-810's	—	—	14
Oregon	Sidney S. Williams	W7GUX	42-807-T55's	e.c.	—	3.9, 14
Washington	S. J. Rankin	W7DQX	41-6L6G-T21-35T	e.c.	S20R	28
Nevada	Frank L. Long, Jr.	W6GSB	6F6-807-813	—	SX17	14, 28
Santa Clara V.	Oswald G. Villard, Jr.	W6YX	E.c.o.-6L6-HK54	—	NC44	3.9, 14, 28
East Bay	D. Reginald Tibbetts	W6ITH	6L6-6L6-35T-100TH	—	—	3.9, 14
San Francisco	R. D. Zehn	W6BFZ	E.c.o.-6A6-807-HK54's	e.c.o.	—	3.9, 14, 28
Sacramento V.	Emil Malek	W6GVM	6L6-HK24-35T's	e.c.	Super Pro	1.75, 3.9, 14, 28
Philippines	F. O. Smith	KA7FS	100TH's	—	PR15	1.75, 14
San Joaquin V.	Peter K. Onnigian	W6QMH	—	—	RME69-DB20	3.9, 14, 28
No. Carolina	W. J. Wortman	W4CYB	6L6-6L6-809	e.c.o.	—	1.75, 3.9, 14, 28
So. Carolina	C. W. Jackson	W4DAM	RK25-807-T55-T125's	—	—	3.9, 14
Virginia	P. B. White	W3FQP	—	—	—	3.9
West Va.	J. E. Hoffer, Jr.	W8CWY	250TH's	—	—	3.9, 14
Colorado	James H. Goss	W9ZIX	6C5-6L6-6L6-T40's-852's	—	Homebuilt	3.9, 14
Utah-Wyo.	Chester R. Ashby	W6DTB	6L6-807-T40's	e.c.	RME9DS	1.75, 3.9, 14, 28
Alabama	E. C. Atkerson	W4ECI	807-RK20-812's	—	SX16	3.9, 14, 28
W. Florida	W. R. Staggs	W4FWY	E.c.o.-T21-814-TW150's	e.c.o.	—	3.9, 14, 28
Georgia	Wm. E. Lanford	W4EGT	T55's	—	—	28
West Indies	Felix V. Rodriguez	K4FKC	807-812-100TH's	e.c.	NC101X	3.9, 14
Los Angeles	Don C. Wallace	W6AM	42-807-HK254-HK354's	—	HRO	3.9, 14, 28
Arizona	E. M. Griffith	W6PQQ	Vari-X-6A6-HY6L6GX's-250TH-	—	—	—
San Diego	Ralph H. Culbertson	W6CHV	300T's	e.c.	—	1.75, 3.9, 14, 28
No. Texas	A. B. Dobbs	W5FJP	E.c.o.-6L6's-T55's	e.c.o.	—	3.9, 14, 28
Oklahoma	Clyde Steward	W5HXX	6SK7-6V6-6L6-6L6-807-HF100;	—	—	—
So. Texas	W. T. Caswell, Jr.	W5BB	6SK7-6V6-802-211; 6SK7-6V6-	e.c.o.	Superhet	1.75, 3.9, 14, 28
New Mexico	Leonard A. Smoll	W5GGX	46-211	e.c.o.	—	14
			6L6-809-T55	e.c.	—	3.9, 14
			802-807-812's-100TH's	e.c.o.	—	3.9, 14
			6A6-807-TZ20's-HK254's	e.c.	NC101X	3.9, 14, 28
			6L6-HY51-35T's	e.c.	—	3.9, 14, 28



Upper left: W4ECI, Alabama 'phone winner, fourth national high 'phone scorer. Upper right: W6ITH, national high scorer on 'phone. Lower left: W9NDA, only station to work all sections in Eleventh SS, 'phone winner in Illinois. Lower right: W9YQN, Kentucky 'phone winner and second national high.

52,542 and knocked off 417 contacts in 63 sections. Reg is to be commended for a dandy performance. Certainly he knows the meaning of the word "proficiency" when it comes to radiophone operating! A new threat to W6ITH's position is W9YQN who came up from eighth in the previous Sweepstakes to second place with 363 contacts in 59 sections for 42,539 points. Seventh last time, W5BB pulled up to third high in the 'phone group and scored 40,504 — 331 stations, 61 sections. Next in line with scores over 20,000 came the following: W4ECI, 38,763; W9NDA, 37,504; W4FLS, 33,855; W6QMH, 33,289; W6DTB, 31,860; W1HKK, 31,293; W7HEY, 30,745; W9KQX, 27,043; W9PNX, 26,100; W8QUL, 25,810; W6GSB, 25,650; W9ZVX, 25,025; W9ZTO, 24,640; W6CHV, 23,513; W9ZIX, 23,313; W5IRO, 22,700; W3HDJ, 22,410; W8EMP, 22,040; W9KOH, 21,988; W9OMG, 21,564; W6AM, 21,369; W1IXL, 20,972; W8JAH, 20,776; W5FH, 20,295.

Twenty 'phones worked 200 or more stations. W6ITH led in number of contacts with his 417. Right behind him was W3HDJ with 415 contacts. W6QMH worked 405. Next in order are W9YQN 363, W4ECI 336, W5BB 332, W9NDA 293, W7HEY 280, W4FLS 279, W6DTB 270, W1HKK 258, W9KOH 239, W5IRO 227,

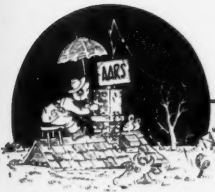
W6GSB 225, W8QUL 224, W9ZTO 224, W1IXL 214, W6AM 211, W9ZIX 207, W9OMG 204.

Clubs

Bettering their score of the Tenth SS by more than 28,000 points, the Frankford Radio Club of Philadelphia finished the race in the club competition with 1,028,787 and again wins another gavel with engraved sterling silver band offered to the group which submitted the highest aggregate score of members. That gang really means business. We wonder what their meetings will sound like when all the boys have gavels! Three cheers to you, Frankford. The Greater Cincinnati Amateur Radio Ass'n. was second among the clubs with 936,752. A consistent contender for club awards, the Milwaukee Radio Amateur's Club stepped into third place with 442,917. Certificates are also being awarded to the high participants (c.w. and 'phone) in each club turning in three or more entries. A tabulation showing the relative standing of all the groups participating and the calls of individual winners is presented to give a complete picture of club participation.

The Eleventh ARRL Sweepstakes was without question one of the greatest amateur radio operating activities ever held.

(Complete Scores on page 82)



ARMY-AMATEUR RADIO SYSTEM ACTIVITIES

THE Secretary of War issued the following special message to all amateur radio operators coincident with the annual observance of Army Day on April 6, 1941:

To All Amateurs:

Incident to the annual observance of Army Day, I am pleased to acknowledge the important work that American amateur radio operators, particularly those affiliated with the Army Amateur Radio System, are doing in building the national defense structure.

Many amateur radio operators are in the military service at the present time. A large number also have volunteered their services as instructors to teach radio code and theory in their communities. Many are helping to train interested young men to qualify as radio operators for the expanding army.

The ramifications of our armed forces require a host of skilled radio operators and technicians. I am confident that, as in the past, the amateur radio operator will do his part in building up an impregnable defense for our country.

HENRY L. STIMSON
The Secretary of War

This message was first transmitted from Army Amateur Net Control Station, WLM-W3CXL, Washington, on 3497.5 kc. and 6990 kc. at 7:00 P.M., E.S.T., Monday, April 7, 1941. Other AARS stations were requested to rebroadcast this mes-

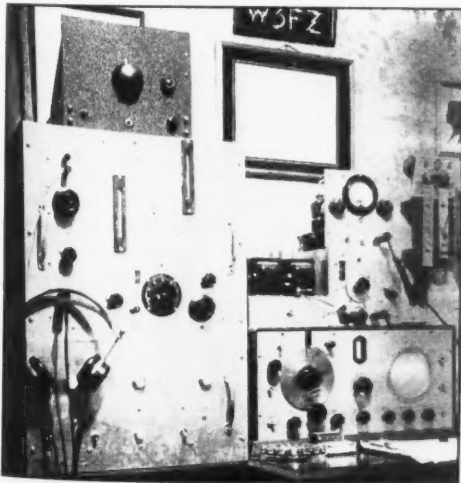
sage on the various amateur bands for reception by all amateur radio operators. Within a short time the amateur frequency bands were almost covered by Army-amateur and other amateur stations transmitting the message on both c.w. and 'phone. Incidentally, this was a successful test of how quickly information could be disseminated by amateur radio stations.

ARMY QUESTIONNAIRE

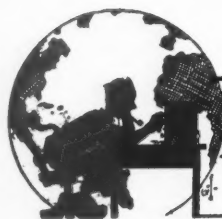
THE distribution of the W.D. OCSigO Form No. 170, questionnaire to all licensed amateur radio stations in the United States, was completed by April 15th in all corps areas. The excellent cooperative spirit and the interest of the average radio amateur in voluntarily accomplishing this questionnaire for national defense purposes were indicated when a preliminary survey showed more than 75% returns during the first few weeks. It is hoped that all questionnaires will be returned before May 15th so that the necessary coding and tabulation work can be initiated without delay. One copy of the questionnaire is being retained in the respective Corps Area Signal Offices and the other copy is forwarded to the Chief Signal Officer, Washington, where the compilation work will be centralized.

ARMY NET MONITORING STATION W3FZ/WLMP

W3FZ/WLMP, owned and operated by Dean S. Young, 1100 Garfield Street, Bethesda, Md., is the Army Net Monitoring Station. Mr. Young built most of the equipment illustrated. Frequency measurements are made using a 1000-kc. "A"-cut crystal which is held to better than 0.1° Centigrade as the basic frequency control. 100-kc. and 10-kc. locked oscillators and amplifiers, variable heterodyne oscillator and audio-frequency mixing circuits are all incorporated in the control unit, including a direct-reading audio-frequency meter. Mr. Young first zero-beats a signal in the receiver and then measures the resultant beat note against a standard check point. Accuracies better than 0.001% are obtained in the 3500- to 4000-kc. band. Amateur band edges or any multiple of 100 kc. or 10 kc. can be checked to an accuracy of almost one part in a million or better. W3FZ/WLMP uses this equipment mainly for measuring frequencies of AARS stations operating on the special 3497.5- and 6990-kc. frequencies to assure compliance with the specified frequency tolerances.



Army amateur station W3FZ-WLMP, operated by D. S. Young, Bethesda, Md., with the freq. measuring gear shown gives the gang accurate frequency checks.



HINTS AND KINKS FOR THE EXPERIMENTER



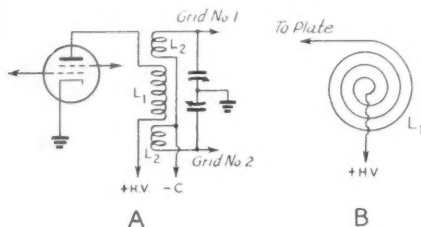
BALANCED INDUCTIVE COUPLING FOR U.H.F.

INDUCTIVE coupling between the stages of u.h.f. transmitters has the advantage of reducing interstage capacities without the complications of link coupling. It is particularly useful in coupling from the output of a single-ended stage to the grids of a push-pull amplifier or a push-push doubler.

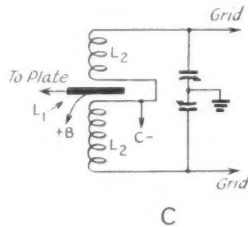
In its usual form, a coil, which is approximately self-resonant, is used on the plate circuit of the driver. The push-pull grid coil of the following amplifier is divided into two equal sections, one on each side of the driver plate coil, as shown in Fig. 1A. One of the difficulties which is almost always encountered with this arrangement is that of obtaining symmetrical drive to the grids of the amplifier or doubler. The reason for this is the unbalance caused by the additional coupling path through the capacity which exists between the plate end of the plate winding and the section of the grid winding coupled to that end of the coil (end connected to grid No. 1 in Fig. 1A). A similar capacity to balance this does not exist between the top end of L_1 and the other half of L_2 .

An effective method of overcoming this discrepancy is to make L_1 in the form of a spiral winding as shown in Fig. 1B. Capacity coupling to either side of L_2 is then made equal. While such a winding might be rather difficult to make for the lower frequencies, a winding for the higher frequencies is extremely simple, since only a few turns are required. The coil may be wound with No. 14 or No. 12 wire so as to be self-supporting. It is not at all difficult to wind the wire by hand into a flat coil and then spread out the turns. To reduce capacity coupling to either side as much as possible, the plate should be connected to the outside turn as shown at C. This arrangement also results in a more compact assembly.

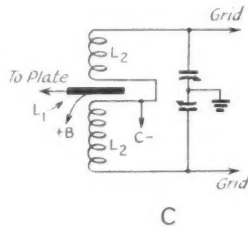
— Milton Mix, W1IPL.



A



B



C

Fig. 1 — A spiral plate winding is used by W1IPL to obtain balanced inductive coupling. A — Usual arrangement. B — Helical plate winding. C — Coupling arrangement with helical plate coil.

HINTS ON DRILLING TUBING AND ROD

THE drilling of lateral holes through metal tubing or rod may turn out to be quite a problem unless the job is properly tackled. It is still more difficult to drill several holes and keep them in the same plane. It is hoped that the suggestions which follow will help to simplify the task a bit.

The tubing should first be clamped horizontally in a vise, or be supported firmly by other means, over a flat surface. A square is then placed with one side resting on the flat surface and the other pressed against the side of the rod or tubing as shown in Fig. 2. With the square held firmly against both surfaces, the wall of the tubing is scratched as the square is drawn along its length.

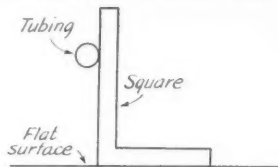


Fig. 2 — Marking line for spotting holes to be drilled in tubing or rod.

The scratch will be perfectly aligned even though the flat base is not parallel with the tubing or tilted at any angle in respect to it. The only important point is that the base must be flat.

The points at which holes are to be drilled are then marked with a center punch along this line. The punch marks should be made rather deep so that the side of the tubing may be flattened very slightly with a file without obliterating them. This flattening will prevent creeping of the drill when the holes are started.

The first hole must be drilled carefully by eye. When it is finished, a machine screw or a piece of wire fitting the hole is inserted. This will provide a "sight" by which the remainder of the holes may be lined up while they are being drilled.

— Vernon Chambers, W1JEQ.

SIMPLIFIED I.C.W. OPERATION

THE kink on simplified i.c.w. operation for u.h.f. rigs which appeared in March *QST* is fine business. But I have obtained such fine results with my kink that I couldn't resist writing about it.

For i.c.w. operation, I simply connect a conventional high-frequency buzzer in series with the microphone winding. Even though the resistance of the microphone winding is a few hundred ohms, I have had no trouble in getting the buzzer to key well with only 2 or 3 volts. A 4.5-volt "C" battery works best. The audio output with this arrangement is very high. Reports have been very complimentary. Only a few parts are required for this system and the tone can be varied over a wide range.

— Michael A. Ziniuk, W8PZL.

SOLDERING TIP FOR TIGHT PLACES

IT's sometimes a bit hard to get the tip of a soldering iron into some closely-crowded spot without unsoldering something by accident just trying to solder in the connection. I had an old tip for the iron, too badly worn to be much good,

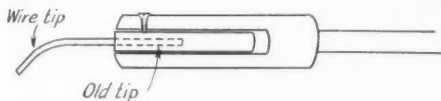


Fig. 3 — Small soldering-iron tip for tight places.

so cut it off so that it was just the right length to fit the iron barrel. Then I drilled a hole in it about an inch deep lengthwise. The hole should be just large enough to provide a tight fit when a piece of No. 8 or No. 10 copper wire is jammed into it. The end of the wire was flattened just a bit, and presto — a soldering iron tip which may be bent around corners or worked into the most congested spots without any trouble. (See Fig. 3.) With either No. 8 or No. 10 wire the length of the piece is determined by how much can be used and still get enough heat at the end to be of any value. For most jobs it needs to be about one and one-half inches long. — Dayton Warner, W9IBC.

OPERATION FROM THREE-WIRE POWER LINES

WHEN a heavy load is thrown on the line in the average home, it is sometimes noticed that whereas about half the lights in the house grow dimmer, the other half become noticeably brighter. Most hams with high-power rigs take advantage of this effect by connecting their plate supplies to one socket in the house, and then connecting their filament transformers to a socket at which the voltage rises when the plate load goes on.

The explanation is deceptively simple. The pole transformer which steps the distribution voltage (2200 volts) down to the normal 110

volts, has two secondaries which are normally connected in series (Fig. 4A), and a wire is run from the center-tap, along with the two outside wires, into the house. Normally, one half of the lights are connected from one of the outside wires to the common, and the other half from the other outside wire to the common. Loads requiring 220 volts, such as electric stoves, can be connected across the two outside wires.

The advantage of the system arises from the fact that as the lighting loads become balanced, there is no longer any necessity for current to flow in the common connection, and accordingly, in Fig. 4B, this wire has been drawn in with a dotted line. Under these conditions, the lighting load is effectively transmitted at 220 volts, and a saving in copper naturally results. The purpose of the common wire is simply to take care of any unbalances.

What happens when a heavy load is thrown on one 110-volt circuit, when only a voltmeter is connected across the other, is shown in Figs. 4C and 4D.

In Fig. 4C, three impedances have been shown in series with each of the three lines. These impedances represent the resistances of the line wires themselves, impedances which are ordinarily negligible, but which in the case of heavy loads are responsible for the voltage drops encountered. Now since the two windings are connected in additive polarity (as they must be if any voltage is to be developed between the outside wires), we can consider instantaneous values as shown in Fig. 4D. In fact, for purposes of analysis, at any particular point in the cycle, the transformer windings may be replaced by batteries of the proper potential. It now becomes apparent from

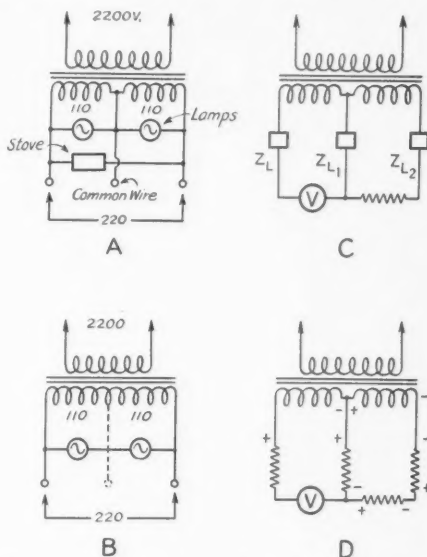


Fig. 4 — Three-wire power-line reference circuits.

an inspection of the diagram, that the voltage drop in the impedance of the common lead due to the load current flowing in the circuit which includes the heavy load is in such a direction as to produce a higher voltage at the voltmeter than that produced by the winding of the transformer itself.

It is very easy to believe, when cases of this are encountered in practice, that some mysterious action in the transformer is responsible for the results observed. This is never the case; if the voltage across one half of a transformer winding is observed when a load is drawn from the second half, it will invariably be found to drop slightly, due either to poor regulation in the transformer itself, or to voltage drop in the wires feeding the primary, or to both.

Voltage drops, produced by a combination of these last two factors, almost always occur at the terminals of ordinary distribution transformers. Hence a compensating voltage drop produced

in the common wire can be very conveniently employed to counteract this effect at the transmitter. For example, it may be used to keep a transmitter's filament voltage constant, no matter how much power is drawn from the plate side of the circuit. A very simple way to adjust the amount of compensation is to vary the load on the filament side of the circuit. This can be done by connecting any receivers, monitors, lamps, etc., to the same outlet plug from which is drawn the filament power. Referring again to Fig. 4B, it is seen that as the loads on the two halves of the circuit become more equal, the current in the common wire is decreased, and hence the magnitude of the compensating voltage.

Whereas the best solution of the voltage regulation problem is obviously the installation of lines with negligible drop, those of the gang who have to put up with things as they are may find the above information of use.

—Oswald G. Villard, Jr., W1DMV.

Code Proficiency Notes

THE WIAW transmissions of known texts on three of the six practice schedules per week makes possible a direct comparison of one's fist and the tape sending. To listen and attempt to superimpose one's own sending on the same copy is to learn good sending by a process of instantaneous comparisons and speedy adjustment and correction of faults. One unconsciously gets the swing of perfect rhythmic spacing and proportioning of characters if he is fortunate enough to hear and copy a great deal of tape sending.

Acquiring advanced code proficiency is essentially a matter of practice. The battle is half won

when you as an operator unconsciously establish a mental standard for coördination of your sending impulses and recognition of characters in reception. To listen and copy any clean-cut tape or automatic transmission is recommended. After initial memorization of characters about one third of one's practice should be in sending work. Sending ability is reflected back quickly into increased code receiving speeds.

Comparisons of one's fist and automatic transmission are made with little trouble using the list of WIAW sending-practice subjects. Before the WIAW run which gives about ten minute's practice at each speed, get out the proper QST article to follow. An audio oscillator can be

WIAW SENDING-PRACTICE SUBJECTS

Sun.-Tues.-Thurs., May 22nd to July 1st. From May '41 QST

Start	End
*May 22. 1st par., p. 33.	1st par., p. 86.
*May 25. 1st par., p. 86. Then p. 37.	3rd par., 2nd col., p. 38.
*May 27. 3rd par., 2nd col., p. 38.	On p. 82.
*May 29. <i>The QSL-25</i> , p. 40, box.	1st par., 2nd col., p. 42.
*June 1. 1st par., 2nd col., p. 42 to end WWV. Then p. 45.	Near end p. 45.
June 3. <i>WLID</i> , p. 27, May QST.	Middle 2nd col., p. 28.
June 5. <i>It Seems to Us</i> , p. 7.	Two pars. of p. 10.
June 8. <i>Keying the CO</i> , 2nd par., p. 10.	In 2nd par., p. 13.
June 10. <i>Grid-Block Keying</i> , p. 13. <i>Improved ECO</i> , p. 14.	1st new par., p. 16.
June 12. 1st new par., p. 16. <i>Strays</i> , p. 74; <i>WWV</i> , etc., p. 78.	P. 78.
June 15. <i>In the Services</i> , pp. 18, 19, 70. <i>25 Years Ago</i> , p. 70.	P. 70.
June 17. 112-Mc. Station, p. 20.	P. 22.
June 19. <i>56-Mc. Arrays</i> , p. 23.	<i>The Month in Canada</i> , 3rd par., p. 26.
June 22. <i>Code Proficiency Program</i> , p. 40.	P. 64.
June 24. <i>Fist-Tape Comparisons</i> , <i>Advance Sending</i> , p. 64; <i>Convention</i> , p. 66; <i>Books — Code Table</i> , p. 68.	P. 68.
June 26. <i>On the Ultra-Highs</i> , p. 33.	112 Mc., p. 35.
June 29. <i>112 Mc. and Up</i> , pp. 35, 82; <i>Operating News</i> , p. 45.	2nd col. (N. Z.)
July 1. <i>Hints and Kinks</i> , pp. 42-60. <i>Michigan Emergency Council</i> , p. 50.	P. 50.

* April issue.

connected to one earphone and a telegraph key, with the receiver output connected to the other headphone. Just a buzzer-battery keyed combination with the automatic transmission properly tuned in will make a comparison of your Sunday-best sending with tape transmission possible. Your own ear can tell you how your fist can be "adjusted" better than any observer. Try it!

The practice is sent nightly except Friday from W1AW starting 9:45 P.M. EST (6:45 P.M. PST) using 1762, 3825, 7150, 14,253, 28,510, and 58,970 kcs. Approximately 10 minutes' practice is sent at progressive speeds of 15-20-25-30-35 words per minute. Besides this special practice material ARRL official messages "to all radio amateurs" are sent by tape at 8:30 P.M. and midnight EST at one of the three lower speeds, giving opportunity for additional practice. Opportunity for getting the League's Code Proficiency Certificate Award or to try out for a silver endorsement sticker (for demonstrating increases from the original word speed certified) will be given in two June qualifying runs, as follows:

June 1st (Sun.), 1:30 P.M. EST. (Text at 1:45 P.M. EST.)
June 17th (Tues.), 9:45 P.M. EST. (Text at 10 P.M. EST.)

ARRL aims to extend code proficiency certificate recognition at some speed above government license requirements to every FCC amateur licensee. By your participation you help the League demonstrate the training values inherent in amateur radio operating. Are you in on this defense program? Don't rest until you have qualified for one of our code proficiency awards.

Practice copying the W1AW runs; get into amateur traffic work; follow some commercial press and weather skeds (see page 52, May *QST*), etc. Then on June 1st or 17th, be on hand and copy the test text at the best speed you can. Underline the *full minute* of perfect copy necessary to qualify at any speed. Tell us if you copied by ear without help except for your pencil or mill (mention which used), and if you are working for first certificate or endorsement. Send in copy and statement. We will check your paper with the official tape, then advising you of success or failure, sending any appropriate award or advices within about thirty days from the date of any *qualifying* run. Responsive to demand, the "code program" was recently expanded. Get after your "proficiency ticket" to-day if you haven't it already.

— F. E. H.



Silent Keys

It is with deep regret that we record the passing of these amateurs:

Victor Ewart, W7COO, Evanston, Wyoming

John E. "Pop" Garvey, W8RID, ex-W8QJO, Cleveland, Ohio

Frederick G. Gottsch, W2BTF, Brooklyn, N. Y.

Dennis Lee Grimes, W4GRD, Memphis, Tenn.

Sterling E. Hess, W8FMN, Factoryville, Pa.

Emmett Johnson, W7CBA, Astoria, Oregon

Laurence E. King, W2GSM, Albany, N. Y.

Henry Lind, W2CLB, New York, N. Y.

Dr. William D. Mitchell, W9GGS, Denver, Colo.

Robert Martin Payette, W8ULI, Athens, Mich.

Willis L. Ransburg, W8NIP, E. Cleveland, Ohio

E. N. Swan, W7DUE, Portland, Oregon

Benjamin B. Swartwout, W2FRU, Port Jervis, N. Y.

Strays

The staff of *QST* extends hearty congratulations to Willard B. Cowles in receiving the Erskine M. Ross Prize of \$3,000 for the best essay on the subject, "The Prospective Development of International Law in the Western Hemisphere as affected by the Monroe Doctrine." Mr. Cowles, formerly a ham from Plainville, Conn., may be remembered as "Production Manager on *QST*'s staff many years ago. He is now special assistant to the Attorney General at Washington, D. C.

— — — — —

During an early-morning 1.9-Mc. rag-chew with W3EVH, WSMGY received a telephone call from a local b.c.l. who had heard him on his b.c. receiver. On hearing WSMGY pass along his "handle" as Ned, the listener searched through all the first names in the telephone directory until he found a *Ned* in the neighborhood who might be WSMGY. Upon running down his man, the b.c.l. popped the question (strange as it may seem), "How can I become a Ham?" — W3EVH.

— — — — —

W5JNO, who earns the money with which he buys his solder by working as a detective for the Dallas Police Department, had no trouble in remembering license plate *New York 6L6* when the car was reported stolen. Yes, the car was recovered.

★ I. A. R. U. NEWS ★

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Asociatia Amatorilor Romani de Unde
Seurte
Associazione Radiotecnica Italiana
Burma Amateur Radio Society
Canadian Section A.R.R.L.
Ceskoslovenski Amatérli Vysilaci
Deutscher Amateur Sende-und-Empfangs
Dienst
Eesti Raadio Amatooride Ühing
Experimental Radio Society of Egypt
Experimenterende Danske Radioamatører
Federation des Emetteurs Belges
Irish Radio Transmitters Society
日本アマチュア無線聯盟 Japan

Lietuvos Trumpju Bangu Radio Megeju
Draugija
Liga Colombiana de Radio Aficionados
Liga de Amadores Brasileiros de Radio
Emissao
Liga Mexicana de Radio Experimentadores
Magyar Hírdhullámú Amatőrök Országos
Egyesülete
Manchoukuo Amateur Radio League
Nederlandsche Vereeniging voor Interna-
tionaal Radioamateurisme
Nederlandsch-Indische Vereeniging Voor
Internationaal Radioamateurisme
Newfoundland Amateur Radio Association
New Zealand Association of Radio Trans-
mitters

Norsk Radio Relæ Liga
Polski Związek Krotkofalowcow
Radio Club Argentino
Radio Club de Cuba
Radio Club Venezolano
Radio Society of Great Britain
Rede dos Emissores Portugueses
Reseau des Emetteurs Français
Reseau Luxembourgeois des Ama-
teurs d'Ondes Courtes
South African Radio Relay League
Suomen Radioamatöörlitto r.y.
Sveriges Sändareamatörer
Union de Radioemisores Españoles
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia

CALENDAR

IN REPORTING briefly on the status of its member-societies, now 37 in number, the 26th Calendar of the Union, dated December, 1940, strikes a somewhat more optimistic note. To quote, "This arises not because the international situation as a whole is improved, but because the several member-societies have for the greater part displayed the commendable determination to continue activities even in countries actively at war."

The Union bids welcome to its newest member, the *Liga de Amadores Brasileiros de Radio Emissao* (Brazil), affiliated as a result of the unanimous adoption of Proposal No. 49. The I.A.B.R.E. is one of the oldest and best-known amateur organizations on the South American continent. It is entirely non-commercial, the only amateur organization recognized officially in Brazil, and covers the whole country. All licensed amateurs in Brazil are compulsory members. "QTC" is the society's official organ.

Proposal No. 50 recommends the admission into membership of the *Radio Club Uruguayo*, which if voted affirmatively will make a total of 5 South American member-societies — three of them added within the past year.

SPAIN

DESPITE numerous attempts, the newly reorganized U.R.E. has not been able to have the transmitting ban lifted for amateur licenses. Secretary Cordova points out that there has been no definite refusal, but rather the matter is still involved in official red tape. Amateurs continue paying a fee for transmitting licenses and have salvaged much of the equipment they possessed before the civil war. "URE," the society's official

organ, has not resumed publication due to restrictions on the consumption of paper.

Due to the ban on transmitting the society's membership has fallen off somewhat, but there are still a good many faithful amateurs on the roster. QSL service is very limited, but is performed periodically. U.R.E. has by no means given up hope for the eventual official approval of transmitting activity, and continues in contact with all concerned.

NEW ZEALAND

A RADIO EMERGENCY CORPS is selecting ZL amateurs, who are being granted permission to retain their transmitting equipment, to act as permanent emergency stations in coöperation with the country's home-defense system. "Break-In" says that it is also proposed to build a number of portable stations in various districts for communication supplementary to the fixed units. Local club groups of the N.Z.A.R.T. are holding classes in operating and maintenance of equipment to ensure a high class of personnel being available to man these defense stations.

GREAT BRITAIN

DESPITE handicaps attendant to operating under wartime conditions, the R.S.G.B. has shown much progress in the past year, ending 1940 in a strong financial position and with a growth in membership. New members average forty per month. It is to the recognition of the amateurs on active service, whence come most of the new members, that Secretary Claricoats attributes the Society's success — where others in similar positions have fallen backward or closed down completely. A grand example, OM's!

The Society begins 1941 with several new offi-

cers: Alfred Gay, G6NF, as president, succeeding A. E. Watts, G6UN; E. L. Gardiner as executive vice-president; and J. W. Mathews, G6LL, as honorary editor.

Contact with communications authorities continues to be good, and there is a bright outlook for post-war amateur radio in England. Over eleven hundred amateurs in military service have proved the value of amateur training again and again.

25 YEARS AGO THIS MONTH

AS THE first summer of its life approached, the editor of *QST* was worrying whether he should try to continue through the summer or fold up; he complained that his *QST* income curve had taken "a droop to beat all previous droops a mile." Because of static, the fellows were forcibly slacked up on operating, but do they lose their interest in amateur radio? He decided to chance it, get out a June issue and see the result, but he warned, "If you have not paid your annual dues, get someone to loan you a dollar quick and QSR."

The leading technical article, the first of many *QST*-published papers delivered before the Radio Club of America, was "Wireless and the Aeroplane," by L. J. Lesh. It was chiefly devoted to the description of an eight-bladed 24" fan mounted above the pilot's head on a Curtiss pusher, belted to a $\frac{1}{4}$ -kw. 500-cycle generator. In tests, a DX of several miles was covered while traveling 45 m.p.h. at heights varying from 100 to 600 feet. Nice going!

Static is so bad (and so many hams are taking summer jobs on the Great Lakes) that Trunk Line E has been closed down until September. But 2FH reports working 8NH for half an hour and 9TC for ten minutes, remarkable work for May. Harold C. Bowen's special-license station IZF, 425 meters, has a new $\frac{1}{2}$ -kw. Hytone and has worked 90 miles. Gustave Werner, a member at Lynn, Mass., sends baseball scores daily by arrangement with the *Lynn News*; he has a reliable range of 30 miles. But John P. Gaty's station can work 85 miles to 3AFA at any time of the day, and has worked 110 miles, messages on freak nights being copied from Nebraska and Georgia — which remarkable results the editor certifies from a personal visit. 8AEH has installed a new loose coupler of much smaller dimensions and immediately his receiving range went up; he strongly advocates the use of a small loose coupler for short waves, with a large one for longer waves. In correspondence, Reverend A. J. Manning, 8JZ, proposes that owners of the more efficient stations give detailed descriptions of them, for mutual help. He has worked ten states, maximum DX nearly 1000 miles, and his descrip-

tion of his own station shows that he knows precisely what he is doing.

3TQ praises 8VX, W. T. Fraser of Buffalo (later an ARRL director), for having got up a printed post-card signal report which gave him his first intimation that he could be heard 400 miles when he thought his range was 75. This is apparently the first QSL card. The new Query Department settles down to business and one of its first customers is L. C. Herndon of Portsmouth, Va., now FCC inspector at Seattle. Four questions he asked, too. Ham-ads show a lad in Illinois named Warner trying to swap a 133-cycle motor for a wavemeter and getting no takers rapidly. Lindley Winsor of Bakersfield asks about the theory of Captain (later Rear Admiral) Bullard and the editor explains a remarkable ionosphere: "Captain Bullard's theory assumes the earth to be a large conductive surface and above it, a second surface with the intervening atmosphere as a dielectric. The height of the conductive surface above the earth depends considerably on the temperature. The higher the conductive surface is above the earth, the less is the capacity of the condenser; consequently, the electric waves held between the two surfaces of different distances apart, depend upon the temperature. With the higher temperature of daylight, the signals should be correspondingly weaker than when the conducting surfaces are nearer together as at night when the temperature falls. The conducting surfaces being nearer together and the energy concentrated in a small space, makes the intensity of the signals greater."

— K. B. W.

DX Notes

ACCORDING to a report received on reliable authority, the operation of amateur stations in American Samoa has been prohibited since July, 1940; the prohibition will remain in effect indefinitely. This means then, gang, that any station purporting to be there since KH6SHS left is just an out and out phoney, so don't waste your time and money trying to get a QSL from anybody else. . . . W8JIW knocked off KD4HHS on 14 Mc. with 20 watts. . . . W5FYZ worked KF6JEG/KG6, who wants the information passed along that he now has a supply of cards which will be sent out for all contacts with him on Canton and Jarvis, and also that he will soon be on 'phone between 0000 and 0300 G.C.T. . . . W8NBK says there is a reward out for the QTH's of VP3TEST, EA7AV, TG9AS and TA1AL all of whom owe him cards. Can anyone help him? . . . W9BQZ reports the following worked on 14 Mc.: K5AV, K5AB, W6POS/K6, K4GPU, K5AH, K6PAH, K7DVM. . . . K5AB, K5AH, K5AP, K5AV, K4GZR, K4HEB. K4HHT, K4SO and K6CGK were raised on 14 Mc. by W9LTW with 22 watts. . . . W2GW relays the dope that ex-KE6SRA was assigned the call KC6SRA but is unable to get permission to use it at Wake; he will answer with a KE6 card from Wake to all those who failed to get one from their Johnston Island contact with him.

Notice to All New England Division Amateurs: Director Percy C. Noble, W1BVR, notifies us that the Annual Division Convention usually held in May has been postponed and will be held in conjunction with the Boston Hamfest sometime next fall.



CORRESPONDENCE FROM MEMBERS

The Publishers of *QST* assume no responsibility for statements made herein by correspondents.

SUPER-DYNAMIC PROGNOSTICATION

74 Webster Rd., Weston, Mass.

Editor, *QST*:

In perusing the current issue of *QST* I came to the article relating to Dynamic Prognostication, and was so captivated by it that I immediately set about constructing the transmitter. Upon completing it exactly according to specifications, I found that it would not work. Then I discovered that I had omitted filament and power supplies, as no mention was made of them in the article. . . .

I observed that the tube became exceedingly hot, and I was distressed at the waste of so much energy in the form of heat. After deep cogitation I hit upon a method of putting this heat to use. I obtained from an electrical supply store one of those articles which consist of two loops of wire, shaped to fit over a lamp bulb. There is a small pivot at the point of junction and on this pivot revolves a brass disk, so cut as to resemble the petals of a large daisy. These petals interrupt the light from the top of the bulb and when placed in a fireplace, under a log, simulate the flickering of flames. I placed one of these devices on the tube of the transmitter and found that it revolved at tremendous speed, impelled by the heat. To the top of the disk I affixed the motor of an old electric razor, running backwards. As I expected, the little generator produced enough current to run the transmitter, so that as soon as it started to operate I could disconnect the power supply and use it for my receiver.

For the filament supply, I use a bleeder across the generator, but I suggest that the experimenter have a first-aid kit at hand (in case of excessive bleeding).

The thought of using the same tube for receiving of course occurred to me, and I planned on snatching the bulb out of the transmitter and putting it in the receiver. Upon searching in the market for a bulb-snatcher I was unable to locate one. It seems they are no longer made, owing to the unfavorable publicity given them by a well-known lamp manufacturer.

In conclusion, may I add a few hints to the improvements which I made in the construction of the transmitter. I found the use of ice pick and scissors very inefficient in working the cardboard chassis, and evoked a better method. I procured a blow-torch and heated the ends of the shafts red-hot, and then pushed them through the chassis at the exact spot desired. I discovered that in heating one end of the shafts the other end also became exceedingly hot, and was forced to desist in my efforts and obtain my furnace gloves from the cellar. Upon returning to my operating table I found that I must inadvertently have moved the blow-torch when leaving, as the flame had burned a neat hole in the metal panel of my receiver. However, I had long contemplated installing a pilot-light on my receiver panel, and found that this hole served the purpose admirably.

I was foiled in my efforts to obtain material to line the inside of the chassis. It was Sunday morning and, musing on the problem, I was idly turning the dial of my broadcast receiver. Suddenly a voice said, "Let us pray." "Why, of course," said I, "exactly the thing, spraying." I thereupon emptied out the contents of the XYL's perfume atomizer, and replaced them with copper-sulphate from an old battery. With this I sprayed the inside of the chassis. After baking for an hour in the oven the sulphate evaporated, leaving a very satisfactory coating of copper. . . .

—G. W. Bailey, W1KH

P.S. In looking through the dictionary to settle several controversial matters in connection with the writing of this

letter, I discovered that the meaning of the word "editor" was derived from the Latin verb "*edo*," meaning to "give out," and "*toro*," meaning "bull." Did it ever strike you that way?

—GWB

CAUGHT IN THE DRAFT

Fort Monmouth, N. J.

Editor, *QST*:

I believe a good many of the boys would be interested to know what's going on among the drafted hams, so I decided to sit down and write a few lines.

I was inducted on Feb. 27, 1941, and then shipped to Camp Upton to be outfitted. Upon arrival we were given towels, soap, razor and brush, and assigned to a tent. We slept six to a tent and had a small bed with a mattress, pillow and case, and two sheets and four blankets. The tents were kept warm by a small coal stove.

The following day we were awakened at 6:15 A.M., which allowed us fifteen minutes to get dressed and fall out for reveille at 6:30. After this we had a half hour to wash, make our beds and clean up the tent. At seven A.M. we went for chow which consisted of cereal, milk, fruit and french toast and maple syrup. After chow we retired to our tent and awaited further orders.

At 7:45 A.M. we were taken to the processing building which outfits us. I was completely outfitted except for a jacket (called a "blouse" here). I am 6 ft. 1 in. tall and weigh 225 lbs.; perhaps that's the reason they didn't have a blouse to fit! I was very fortunate never to have had K.P. due to the fact they didn't have work clothes large enough to fit me!

After waiting three weeks I finally received my jacket. On March 28, 1941, I was one of 58 men shipped to the Signal Corps Replacement Center at Fort Monmouth, N. J. Upon arrival here we went to chow and found out the cooks here were much better than at Camp Upton. We were given an examination to find out which part of the Signal Corps we would be placed in. On March 31, 1941, we will be assigned to a company for our 12-week training period. After this we will be sent out wherever a man is needed for our particular type of work. They train men for all types of work here, such as radio, teletype, telephone, auto mechanic, clerks, etc.

At present I can't give you any information in regard to radio activities here because I have not begun to go to classes yet, but will do so as soon as such information is available. . . .

—Pvt. Sol A. Sterman, W2JW

WOTSA, OT'S?

1606 Pandora Ave., Westwood Hills, Los Angeles, Calif.

Editor, *QST*:

Last night W2HXI and I were having one of those nice, long 80-meter rag chews, the kind where both use break-in, and inevitably our conversation drifted around to the "good ole days." It's been known to happen before.

But this time we went in pretty deep. Bemoaned the fact that nowadays a fellow never sees his old friends on the air. Too wide a divergence of interests. Your best friend could be on 75-meter 'phone and he'd be the last one to tell you. Or he might be right on the same band with you, fiddling away with his bug, but because somebody lent him another

(Continued on page 78)

OPERATING NEWS

F. E. HANDY, W1BDI, Communications Mgr.

J. A. MOSKEY, W1JMY, Asst. to the Coms. Mgr.

Revoked! On April 22, 1941, the Federal Communications Commission adopted orders revoking the amateur radio station license for W9LMY (Mitchell, So. Dak.) and suspending the licensee's amateur operator license. Why? ". . . because licensee while engaged in the operation of his station communicated by radio with HR1AT located in a foreign country, and failed to keep a proper log, all in violation of the Commission's rules." Another amateur station license was similarly revoked because the licensee whose license had another year to run failed to file and refused to file with the FCC his response to Form 735 to establish his U. S. citizenship.

Order No. 72 must be observed by all amateurs. We mention the instance above just to emphasize that simple fact. We have been told that there was some cheating going on even in spite of the helpful efforts of Official Observers and other amateurs who have been busy making radio calls to any U. S. amateur heard slipping from grace to remind and caution about observance of Order 72. Some simple minded amateurs have perhaps thought they could get away with working a foreign station just by omitting its call!! With the foreign amateur logged calling and working them that proved a dead give-away though. No sensible licensee would expect to avert penalties by such a ruse. Several times in this column we have warned against answering certain D4's, CM-CO's, HK's, etc., that have been reported. Any W-activity constituting a foreign communication smirches the reputation of all amateurs at the same time it endangers the license of the responsible operator. Because any such work increases the potential danger of restriction for all amateurs, this item calls for all amateurs to be highly alert and constantly vigilant to assist in enforcing compliance of FCC's Order No. 72, as well as to avoid any carelessness or omissions of even a single transmission in amateur station log keeping.

Eternal vigilance . . . is the price of liberty.

To Gain Copying Ability — Write It Down. Many amateurs have just recently come to realize that writing-down ability is a too common weakness. This is to suggest quite frankly that all amateurs make a practice of *writing down* everything that comes over the air, even rag-chewing stuff! This writing-down habit, we assure you, will be translated into real progress in copying ability.

Code Proficiency progress is largely a matter

of constant practice to cultivate and develop the power to coördinate. Writing-down ability must be coördinated with the training of the faculties of hearing and understanding code signals to create useful copying ability. One chap thought his writing-down ability alone was his stumbling block on the path to certificate recognition. He made a test of setting down copy read to him from a paper and found, with surprise, that his initial speed of pencil-pushing was only about 20 w.p.m. but that he could double it with practice. Mill copy is something so to be desired that no real operator is satisfied until he can copy code accurately on a typewriter as well as with a stick. Too many amateurs are backward in essential operating-copying ability because they have never done much writing down of copy in their amateur work. So we suggest a new slogan . . . write it down.

Some time ago we mentioned that in using 'phone it was an essential and often overlooked courtesy to fellow operators to write down the remarks. The same goes for c.w. remarks. There is a difference between note making and accurate copying, too! You fellows who think you can do 15-, 14-, 20- and 25- w.p.m. C.W., do you mean that you can pick out a few words at will, or get the general drift of a conversation at those speeds, or that you can *really copy plain language text mixed with numerals with perfect accuracy* at the indicated speed?

The excellent response to the W1AW runs indicates universal amateur interest in the subject of Code Proficiency. If you have a certificate from Hq. based on this W1AW program of qualifying runs, we know that you have proved to yourself and everybody else that you have the demonstrated ability, and are not just another hot air artist. If you can't put it down in black and white and make an accurate transcription of what was sent, then you cannot call yourself an *operator* in the true sense of the word. Make a practice of writing everything down, to gain confidence and the ability to put ten on a line like a professional!

There's plenty going on to write down each of the 24 hours of the day. W1AW's schedules for code practice, and sending practice, and qualifying runs are given in a separate article so will not be repeated on this page this month. Copy on paper, *not* just in your head, and you will be surprised to see what the program will do for you. We got an informal report on some code tests conducted of new men in the service to check

operator ability reading, "Once again the traffic-handling hams came through as the best code men. . . ." The *copying down* type of operator training comes naturally to those who get into traffic fun and nets involving use of procedure and need for accurate *writing out of texts*. Real operating ability is the ability to take it on the air, through QRM, QRN, QSB, etc. It takes savvy, practice on counting the ten on a line as they come, practice in copying accurately just what is sent under whatever difficulties, practice in *writing down*, to make the finished operator. Amateur operating is capable of creating that superlative ability to take it as an operator that sticks with a fellow longer than results of intensive radio school courses from working and listening right on the air . . . if you will *write it down*.

Listen to press and WIAW runs. Satisfy your natural curiosity as to the speed you can get down on paper without errors. Send us a copy of a WIAW Qualifying Run (June 1st and 17th, see page 58). If you haven't got your recognition or

proof of what you can do for the top bracket, you are now eligible for certificate and sticker awards which we aim to extend to every licensed U. S. amateur operator. Write it down!

1941 Field Day Here. June 7th and 8th are the dates. Full detailed announcement of the Ninth ARRL Field Day appears elsewhere in this issue. Whatever you do, don't miss the F.D.! Operating afield is a barrel of fun and fraternalism, as well as an intensive training in cooperative planning and endeavor. A Field Day should involve putting up antennas and feedlines (ready-cut for emergency), connecting and nursing equipment for effective operating adjustments, planning relief operating shifts so a full quota of contacts is made. Living and working together for a period in the open involves a commissary problem. A F.D. represents emergency testing of operator ability and stamina as well as that of the equipment! Get your notification under Order 73-D in to FCC early and be on deck in the 1941 F.D.

— F. E. H.

The Month in Canada

From letters received in reply to the circular sent from Headquarters, this column should make real interesting reading, not only for those of us who are still at home, but more particularly for the boys on active service, and these are the fellows we want to know more about, so it is up to each and every one of us to pass along to our old club secretary, SCM, to me, or direct to Headquarters, everything of interest to amateurs, both at home and abroad. We are all waiting anxiously for the appearance of our first column in nearly a year and a half. The results are up to each and every one, so let's put it over with a bang! For those of you who have sent along suggestions, please accept this as my acknowledgment and thanks. With the encouragement I have received, our column is bound to be a success.

73.

— Alex Reid, VE2BE

AS STATED by CGM Reid above, "The Month in Canada" column is ready to take off. The propeller is turning, the motor throbbing briskly, the landing gear straining against the brakes. The craft is in prime condition for a long and successful flight. All that is needed now is the fuel to keep it going! So send it along, fellows—send along the news and "bull" that will keep us flying fast and high and with a tank full of the latest VE doings.

Our introductory announcement on page 26 of May QST stated that we hoped to be able to centralize the news for this column through the SCM's, as in the past. It is evident now that there will be complications in doing so, for some are away from home and others are simply too busy with special labors for "paper work" of this kind. In those sections we will endeavour to locate other regular correspondents as time goes on. For example, VE3AZ has already agreed to serve in lieu of Ontario's SCM, VE3EF, since Dr. Gunn is now on active service. Quebec's SCM Morris, VE2CO, is on the job, and will, of course, receive reports for that Section. As for the rest of you fellows, until further notice send your dope to West Hartford, won't you? We'll do our best to correlate it here and print it in the column.

QUEBEC

AND now Lin Morris, 2CO, will take the floor with the news from Quebec:

IN, JZ, and Bev of CP are with the National Research Council at Ottawa. HW instructs in signals at RCNVR. LC is at Trenton. GM, EE, JS and OB are in the navy. FO is in Toronto, while 3AKO is back in Montreal. HP is stationed at Megantic, and IT is now in Montreal. 5TD flew east to attend his father's funeral; he reports meeting IO (now with RCAF) in Vancouver. OR has a junior op. GO, OU, PW & CO are instructing at McGill COTC. HO and GE are studying hard for their army commissions. CR moved to Toronto same week as his brother from there moved to Montreal.

WIKH met a number of the gang on his visit here. BE is reported to be gaining esteem as poker player. (Whatsa, Alex?—Ed.) Others on active service are: EN, FE, CD, BO, FG, LV with the air force; BU, BK, AR with the army. FE says he has met more VK's and ZL's now than he ever heard on the air.

The old noon-hour gang at Chez Payette's has dwindled away, though the old reliables, DR, HV, FV and MU, are usually on deck. HE is married. DE just received his commission in the navy. DU is president of the Young Men's Canadian Club of Montreal. IE has taken up home movies.

Fellows, let's keep together as much as we can during these times. This column will be a great help, so please send in your news items regularly to CO so that they will be reported here.

ONTARIO

NEXT we will hear from Len Mitchell, 3AZ, who has been gathering the news from Ontario:

The Wireless Association of Ontario, Canada's oldest radio club, which has been in continuous existence since 1913, has been carrying on as usual since the outbreak of the war. Faced at that time with the necessity of deciding whether to disband "for the duration" or to carry on in spite of the war-time ban on amateur activities, the Executive decided to carry on as long as possible. It was felt that as the members could not meet "over the air," the club meetings would afford an opportunity of rag-chewing and getting together "as of yore," and also it would keep together the nucleus of an organization for post-war activities. Although the Executive has experienced more than the usual difficulty in getting suitable speakers, their efforts have been more than justified and the meetings are as well, if not better, attended than before.

Recently a new series of talks has been inaugurated for the junior amateurs. These talks are to be given each meet-

ing night before the commencement of the regular meeting so that the senior members may come at the usual time to the usual meeting, and the newer amateurs or prospective amateurs who come for the junior talk can also stay for the general meeting. The ARRL Handbook is being used as a basis for building the outline of the talks, the first of which was given on April 17th by Fred Rogers, 3IQ. It dealt with general a.c. characteristics, and each talk thereafter will deal with some other department of amateur radio practice until the whole field is covered. The main speaker at the meeting on April 17th was Mr. E. Olson of the Canadian Westinghouse Co. Ltd., who spoke on "RF Amplifiers and Converters."

In his spare moments 3IB has been teaching code and radio theory to prospective applicants for enlistment in the armed forces. IX was recently appointed to the RCAF with the rank of flying officer. CP is stationed at the Canadian Signal Training Centre at Vimy Barracks.

At the beginning of the war when the ban was put on amateur operation, one Toronto amateur received his license in the same mail as the notice cancelling it!

Hutchinson, DU, reports the following from the London (Ont.) district: AAO, ALX, AUI, KD, VT and WP are on active service with the RCAF; HG and KC on active service with RCN; AH, ALF, AQG, CM, HZ and SD are on active service with RCCS; AQF, AQJ, AQB and DU are in reserve RCCS; QC has recently changed his QRA to Fort Erie and AJH has moved to Windsor. WX has moved to London and is working in the Income Tax Department. TN is still in the barber business. AJQ still looks after his cows and chickens, and his wife in his spare moments. HI, who has been quite ill, is on the mend now; we all wish him a speedy recovery. AJE seems to have gone into hiding, as DU reports he never sees him any more although he works just across the road from DU. DU changed QRA on May 1st to 858 Lovett Street, by the way.

GENERAL

LEAVING CBC for a commission as flying officer at the No. 3 Wireless School, Winnipeg, 4SS is serving as educational officer with the RCAF and British Commonwealth Air Training Plan.

IKQ has been in England since January, a leading aircraftman (radio) in the RCAF, his sister Isobel writes.

3QB is interested in confirming whether or not Horace Stark, 3UH, was the first VE ham casualty of the war. Does anyone have information we can pass along?

And that's the program for this month. We'll be seeing you next meeting. In the meantime, won't you write us and tell us what's news for "The Month in Canada"? Thanks, and 73.

— C. B. D.

Hamfest Schedule

June 1, 1941, at Norfolk, Nebr.: The Annual Hamfest of the Northeast Nebraska Radio Club will be held Sunday, June 1st, at Ta Ha Zuka Park, Norfolk, Neb. Further details may be obtained from NNRC Secretary, Willis N. Drees, W9IYM, Wisner, Nebr.

June 21-22, 1941, at Panama City, Fla.: The Panama City Amateur Radio Club will hold its First Annual Hamfest June 21st and 22nd. The affair will feature several contests, and a large number of amateurs from Florida and surrounding states is expected to attend. Write C. H. Beach, W4BJF, Chairman, Panama City Radio Club, P. O. Box 713, Panama City, Fla., for additional information.

Brass Pounders' League

(March 16th-April 15th)

Call	Orig.	Del.	Rel.	Extra Del.	Credit Total
W6ROZ	126	258	1626	248	2258
W3GKO	18	51	1547	43	1659
W3BWT	86	263	942	246	1537
W6ROZ*	110	165	1090	154	1519
W4PL	21	45	1211	38	1315
W9ILH	25	206	966	117	1314
W2SC	28	147	1023	89	1287
W9BRD	55	118	984	104	1261
W7EBQ	65	107	928	93	1193
W6DH	146	222	612	91	1071
W6LUJ	301	382	2	377	1062
W9QMD	31	27	965	13	1036
W9JMG	35	33	947	8	1023
W5DWW	59	54	866	29	1008
W6RWW	81	178	554	163	976
W9GJX	749	43	50	17	859
W6LUJ*	271	293	3	290	857
W4AAO	48	42	731	36	857
W2MNT	48	53	684	40	825
W9NSU	11	2	788	0	801
W8PCN	103	123	464	55	745
W9OZN	11	10	711	5	737
W5MN	56	131	442	102	731
W9QKL	31	52	631	11	725
W8JF	16	7	686	4	713
W6PGB	84	207	204	200	695
W6BMC	40	11	600	5	656
W3HUM	12	159	299	153	623
W6IOX	13	22	558	17	610
W5CEZ	14	140	439	14	607
W5FDR	40	83	402	70	595
W2LZR	31	85	399	77	592
W5IGO	28	27	518	13	586
W6PGB*	70	93	336	87	586
W4DEP	4	51	478	37	570
W7WJ	41	21	498	9	569
W9OUD	37	81	429	20	567
W3BZX	8	10	548	0	566
W2ATJ	53	111	352	49	565
W3AOC	38	48	438	35	559
W2MLW	153	74	266	54	547
W5GFT	63	122	277	80	542
W8JIW	84	160	188	105	537
W7HZI	41	16	450	14	521
W3CIZ	15	33	444	25	517
W1EPE	18	67	408	11	504
W9EKQ	7	18	468	8	501

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del.	Credit Total
KA1HR	1328	916	44	889	3177
W5OW	133	154	1282	81	1650
W3CXL	42	131	724	131	1028
W1AW	82	174	586	148	990
KA1HQ	227	172	184	150	733
W6FWJ	201	47	420	45	713
W4FCU/GFO	39	59	608	0	706
W9KXR	0	0	514	0	514

These stations "make" the B.P.L. with total of 500 or over. One hundred deliveries + Ex. Del. Credits also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count.

W6SPB 364	W8UFH, 220	W6NRP, 153	W3HAZ, 111
W9AEJ, 350	W2KI, 219	W9UQV, 150	W6RGQ, 108
W3ZD, 322	W1AZW, 197	W6ZM, 146	W3AQN, 107
W6IIG, 314	W9VDY, 196	W3CDQ, 135	W5AAJ, 103
W6RBQ, 302	W2CGG, 193	W3BZE, 127	W8SCW, 103
W9VDY*, 296	W9VBQ, 191	W6ZX, 125	W5DDJ, 102
W9SEB, 276	W1LOA, 184	W5CDU, 123	W3BXE, 101
W4HHG/4, 264	W4EVJ, 181	W8GHV, 120	W2BWC, 100
W2LPJ, 249	W6IMI, 180	W4AOB, 114	W4CCJ, 100
W1MGC, 241	W8KWA, 163	W9UN, 112	W4DD, 100
W3JHW, 227			

More-than-one-opr.

W5CEB, 214

W8IHN/NIT/TNU/9, 140

A.A.R.S.

Call	Orig.	Del.	Rel.	Extra Del.	Credit Total
WLMW (W9QIL)	73	217	389	210	889

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del.	Credit Total
WLM (W3CXL)	322	265	2486	265	3338

A total of 500 or more or 100 deliveries + Ex. D. Cr. will put you in line for a place in the B.P.L.

* Feb.-Mar.

ARTICLE CONTEST

The article by Mr. Maurice E. Katzer, W5GTS, wins the C.D. article contest prize this month. We invite entries for this monthly contest. Regarding subject matter, we suggest that you tell about what activity you find most interesting in amateur radio. Here you will find an almost limitless variety of subjects. Perhaps you would like to write on working for code proficiency, Emergency Corps planning, traffic work, working in Section Nets, Phone and Telegraph operating procedures, holding a League appointment, working on radio club committees, organizing or running a radio club, the most interesting band or type of ham activity, or some other subject near to your heart.

Each month we will print the most interesting and valuable article received. Please mark your contribution "for the C.D. contest." Prize winners may select a bound *Handbook*, *QST* Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads, or any other combination of A.R.R.L. supplies of equivalent value. Try your luck!

Let's Improve Our Fists

BY MAURICE E. KATZER,
W5GTS*

I LISTENED to some commercial stations for a couple of hours, and then I turned to the forty-meter band. Wow! What a mess! I had never noticed it before. I suppose that one tends to get used to any kind of sending, no matter how sloppy it is. I did not notice the terrible fists on the ham bands until I listened to some good fists. The difference is amazing. Any similarity between the average ham's fist and a good one is — well it just is not.

A general effort should be made by all amateurs to improve their fists. Naturally, the only way to improve one's fist is by practice, practice, and practice. One must, however, be extremely careful while he practices. Yes, practice makes perfect, but it also makes bad habits worse. One will tend to make the same mistakes over and over again if not careful. Directed practice is best. Practice with a friend, one who can tell good code when he hears it, and will not be afraid to tell you that your sending is sloppy. He can point out your mistakes, and then you know what needs correcting. Bad sending habits are usually harder to break than bad personal habits. You may be conscious of your bad personal habits, but you can never be sure of your sending habits unless someone tells you about them. That is where constructive criticism comes into the picture. Constructive criticism, listening to good fists, practice and patience are the builders of good fists.

You may think that your fist is good because no one has told you that it is bad. Have you ever told anyone that his fist was bad? Probably not. How many times have you had a QSO with a newcomer who gave the eternal excuse that he cannot copy you on account of the QRM? You probably decided that he was a lid and that he cannot copy your code. He probably could not copy your code. But did you ever stop to think that maybe it is you and not he that is at fault? Good code is easy to copy, bad code is difficult; very difficult for the beginner. An old-timer may copy you 100% but he can probably copy anything. A beginner may copy twenty words per minute from a good fist, but can not copy ten words per minute from a bad one! We have public enemies in our ham bands, and they should be exposed.

Public enemy number one is usually unaware of his faults. He is the one with the "swing" on his c.w. Swing is all right in a dance band, but it has no place in a ham band. Code should be regular, precise, and even machine-like. The fellow who does not realize that he has a swing on his code should be told about it. The fellow who has rhythm in his

* 1418 N. Greenwood Ave., Fort Smith, Arkansas.

code and boasts about it, should be, well —. The only way to eliminate swing is to make a deliberate effort to destroy it. Let's save our rhythm for the dance halls, not ham bands.

Public enemy number two is the butcher. Either poor or inconsistent spacing is his offense. He either runs words together, tears them apart, or — even worse — uses a combination of the two offenses. His code reads like this, "We llo glge ssth at that isab tallh er e." Can you read it? He may even butcher the symbols themselves. His dots are usually all right, but his dashes — oooh! They are either too long or too short, or even both; worse if it is both. The receiver has to guess whether he is receiving dots that are too long or dashes that are too short — he usually guesses wrong.

Public enemy number three is the bug. The bug is a machine, and like every other machine ever conceived by man, it must be in proper adjustment, and it must be operated correctly before it is of much use. The bug was invented as a boon to the sender, but it became a bad headache to the receiver. The two greatest faults of the bug are not at all due to its mechanical nature. The worst one is that the operator will try to operate it too fast. He thinks that he is a big-shot because he sends at breakneck speed. Those who listen to him give him other names. The other great offender at the bug is the individual who sets his dots twice as fast as his speed. Have you ever listened to an operator sending fifteen words per minute and his dots set for forty-word-per minute speed? You know how it sounds. This usually always results in too many dots.

Let us all make a conscientious effort to improve our sending abilities. Get out your old buzzer or your audio oscillator, and listen to your fist. It's ten to one that you will be surprised or ashamed, or maybe both.

Cheyenne Emergency

IT NEVER occurred to the S.C.M. when W7HDS was appointed E.C. for Cheyenne, Wyo., that within a month she would be called upon to set in motion the newly formed A.E.C. group there. In fact, I could easily imagine a communications emergency at quite a few other places before settling on the largest city of our state, representing a population of nearly 25,000 persons, an airline and railroad terminal and the capital of Wyoming. Nevertheless, Easter morning found the city besieged by a spring blizzard which unloaded such a great amount of heavy freezing snow on the lines and poles of the telephone services that one by one, lines west, north, east and south gave way under its weight. The telephone office in Cheyenne immediately contacted W7HDS asking her to contact their Denver office if possible. W7HRM was delegated to work 40-meter c.w. W7IMJ took over on 75-meter 'phone while W7HDS tried the 20-meter 'phone band in their efforts to establish contact with Denver. With the aid of W8QUL and W9CAW the messages were put through and the outlet established. The time required for the first message to get through was something short of an hour. Later, another message filed at Cheyenne for Denver was delivered and answered within ten minutes.

The telephone people in both Denver and Cheyenne were very pleased, and high praise was extended the participants by the state superintendent at Cheyenne. Prior to all this on April 3rd, W7HDS was interviewed over the Cheyenne radio station KFBC and told what is being accomplished by the A.E.C., and described the plans for the Red Cross A.R.R.L. Test scheduled for April 4th, 5th and 6th. It can happen here and sometimes does, so it's best to be ready for it!

— HENRY L. SCHROEDER, S.C.M., Utah-Wyo.

WHEN TO TRY FOR WAR

Days	E.S.T., p.m.	Amateur Band Monitored	WAR Frequency
Tues. & Wed.	7:00- 7:45	3500-3900 kc. (c.w.)	4020 kc.
Tues. & Wed.	7:45- 8:00	3900-4000 kc. ('phone)	4020 kc.
Saturday	7:00- 8:30	3500-3900 kc. (c.w.)	4020 kc.
Saturday	8:30- 9:00	3900-4000 kc. ('phone)	4020 kc.
Mon. to Sat.	9:00-10:00	7000-7300 kc. (c.w.)	6990 kc.



IF YOU READ this page a year ago (the issue of May 1940, to be exact), you may recall some of the hundred and one reasons why a receiver is apt to have dead spots at high frequencies. At low frequencies many of these difficulties disappear, but some receivers may have dead spots even in the broadcast band. These may be due to defects such as improper shielding of unused coils, for instance.

When a receiver will not pick up a signal at certain frequencies, many operators assume that there are no signals there. Maybe there are plenty of signals. Maybe the trouble is in the receiver. The test for this is similar to the one described last month for checking RF stage performance. You will recall that in that test, the procedure was to operate the receiver on MVC, with no antenna, and with enough gain to hear the "rushing noise" in the speaker. Under these conditions, killing the first RF stage by touching the grid connection of the first RF tube should cause a reduction in noise. Since the ratio of noise "before and after" is a measure of the RF stage gain, this test may be used to check for dead spots by repeating it at different frequencies. In practice, it is merely necessary to tune slowly through the range of the receiver, tapping the grid cap, and looking for frequencies where this tapping does not cause a noise variation.

A communication receiver should have plenty of gain. When using a crystal filter at maximum selectivity, the attenuation of the sidebands causes an apparent reduction in the strength of the signal, making it desirable to use more gain. Aging of the tubes will cause a gradual loss of sensitivity, so that extra gain is needed in order to get reasonable tube life. For both of these reasons, the set should have a lot more gain than is needed for ordinary work with new tubes. Many amateurs condemn as "noisy" any receiver with this reserve sensitivity because there is so much noise in the speaker when the gain is turned up to maximum. The answer to that one is "Don't turn the gain to maximum unless you need it". That is what the gain control is there for. We think you will agree that it is much better to turn down the gain when not needed, then not to have gain when you *do* need it.

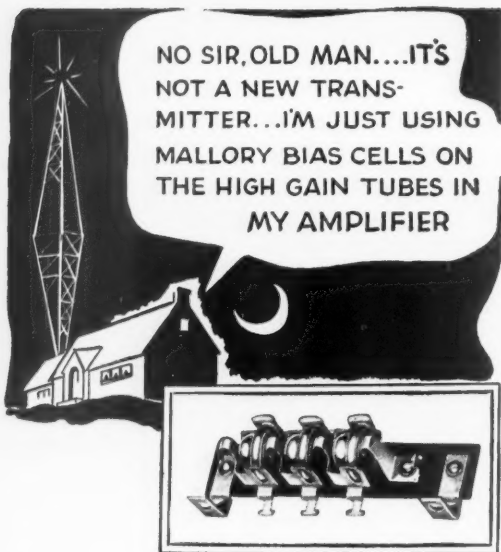
Checking a receiver for images is a rather obvious procedure. The main trick is to make sure that you do not blame the receiver for harmonics in the transmitter (as many amateurs do). It is not difficult to tell them apart, as an example will show. Suppose that you tune in a signal at 14 MC on a receiver having an IF frequency of 475 KC. Since the image of the signal will be separated from it by twice the IF frequency, it can be found by retuning the receiver to either 13.05 MC or 14.95 MC. In most cases you will find the image at the lower frequency. If you use enough gain you will probably be able to find an image, though if the receiver is as good as the NC-200 the image will be at least 30 db weaker than the signal, even at the worst frequencies (10 meters).

Transmitter harmonics are, of course, an even multiple of the fundamental frequency. In the example given above, a spurious signal found at 28 MC should be blamed on the transmitter. It could not possibly be an image.

This finishes our series of three pages on receiver testing without laboratory equipment. We are reprinting them in the form of a small booklet which will be sent to anyone requesting it without charge.

JACK IVERS





BETTER PHONE QUALITY

Ground the cathodes of the high-gain tubes in your speech amplifier. Stop audio degeneration, lower hum-level and improve audio quality. Bias your voltage amplifier tubes with Mallory Grid Bias Cells. They cost less than resistors and condensers required to give anywhere near equal performance.



Mallory Fixed Vitreous Resistors provide standard units for all transmitter and receiver applications. They may be depended upon for long and efficient service... resistance to humidity and resistance to permanent change under extreme overloads.

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Signal Corps Memo

IN MILITARY communications all modes of contact have to be utilized simultaneously as efficiently as possible. In planning operations the weight and cost of equipment must be considered. The number of channels possible depends on the width of frequency band required for a given channel and the number of frequencies or wires available. The requirements for essential accuracy are severe. The following memorandum on message handling by c.w. vs. 'phone, quoted from an official Signal Corps memorandum may be of interest, indicating as it does the fields of dependence and suitability of the two modes for messages of tactical value that must be relayed and recorded for study or reference, or utilized when personal instructions between stations in direct contact are to be handled. We quote:

"The matter of radiotelephony versus radiotelegraphy for handling messages is similar in comparison with the use of telegraphy and wire telephony, respectively. In general, it can be stated that the radio or wire telegraph method is used for record communications. That is, to handle third party messages (destined to persons other than the two operators on the circuit) requires that the text be recorded and later transcribed for delivery through other agencies (by messenger, telephone, telegraph or other radio channels).

"Telephony... whether by radio or wire, involves person to person conversation and the communication normally is not recorded. It is used mainly in military, as well as in some civilian operations, as a command channel of communication; that is for the discussion and issuance of verbal instructions between two commanders or similar agents.

"Amateur radiotelephone station operators do not function in capacities similar to radiotelephone operators employed at police radio stations, airways control towers, commercial air lines, etc. Traffic handled by amateur radio stations, whether they are radiotelegraph (CW) or radiotelephone (Phone) stations... requires recording by the receiving operator for further handling or delivery. In view of the fact that few radio amateurs are expert shorthand stenographers, and because of the many repetitions required and the need of using phonetic spelling to accurately record messages sent by voice, it actually takes less time to handle traffic accurately by telegraph than by voice.

"The cost of a radiotelephone transmitter is almost twice that of a radiotelegraph set of the same power output rating."

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given here-with. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in West Hartford on or before noon of the dates specified.

Section	Closing Date	Present SCM	Present Term of Office Ends
Philippines	June 2, 1941	George L. Rickard	Oct. 15, 1938
Kentucky	June 2, 1941	Darrell A. Downard	Apr. 15, 1940
Vermont	June 2, 1941	Clifton G. Parker	Feb. 15, 1941
Western Florida	June 2, 1941	Oscar Cederstrom	Apr. 15, 1941
New Mexico	June 2, 1941	Dr. Hilton W. Gillett	Apr. 15, 1941
No. Minnesota	June 2, 1941	Edwin Wicklund	June 15, 1941
No. Texas	June 2, 1941	Lee Hughes	June 15, 1941
Sacramento Valley	June 2, 1941	Vincent N. Feldhausen	June 15, 1941
North Dakota	June 2, 1941	Anton C. Theodos	June 14, 1941
Hawaii	June 16, 1941	Francis T. Blatt	Feb. 28, 1941
So. New Jersey	June 16, 1941	Lester H. Allen	June 22, 1941
Iowa	June 16, 1941	L. B. Vennard	July 3, 1941
San Francisco	June 16, 1941	Kenneth E. Hughes	July 5, 1941
So. Carolina	Aug. 15, 1941	Ted Ferguson	Aug. 25, 1941
Eastern Penna.	Aug. 15, 1941	Jerry Mathis	Aug. 28, 1941
Md.-Del.-D. C.	Sept. 2, 1941	Hermann E. Hobbs	Sept. 17, 1941

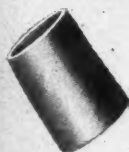
1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two-year term of office is about to be held in each of these Sections in accordance with the provisions of the By-Laws.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed

YOU CANNOT OVERLOAD

Speer

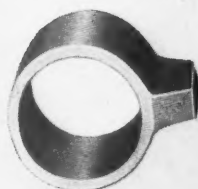
GRAPHITE ANODES



No matter how you slam on the voltage, SPEER Graphite Anodes can take it. Of all anode materials, graphite is the only one that heat cannot fuse — cannot even soften or warp. No matter how hot SPEER Graphite Anodes get, they cannot blow. Think how that increases the service life of transmitting and power tubes!

Besides being literally heat-proof, graphite has many times the relative heat dissipating value of any other anode material. As a result, tubes with SPEER Graphite Anodes can handle more power.

For these reasons and others equally important to tube users, SPEER Graphite Anodes are used by many of the leading tube manufacturers. Write us for a list of them and for a copy of the SPEER Anode Booklet.

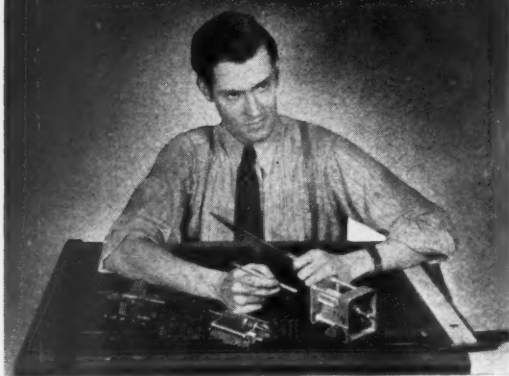


SPEER CARBON CO.

ST. MARYS, PA.



Yesterday... Today ...and Tomorrow



Our yesterday goes back 27 years. At that time, The ALLEN D. CARDWELL MANUFACTURING CORPORATION pioneered the now standard method of condenser construction: the use of metal endplates and grounded rotors, and the supporting of the stator by means of small insulation strips instead of bushings. This was the original "low loss" condenser.

Though the passing of years has proved the merit of this early, basic patented design, its evolution is a splendid example of CARDWELL product development.

Today, literally hundreds of thousands of our units are being employed in practically every type of communications equipment from the lowest power amateur transmitters to the highly complex controls of frequency checking devices.

And while our production facilities are now taxed by tremendous and ever increasing demands, our engineers remain steadfastly at their task, constantly striving for further improvement.

Tomorrow, The ALLEN D. CARDWELL MANUFACTURING CORPORATION will be geared to serve you as never before.

**THE ALLEN D. CARDWELL
MANUFACTURING CORPORATION**
63 PROSPECT STREET • BROOKLYN NEW YORK

from Headquarters will list in alphabetical sequence the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.
38 La Salle Road, West Hartford, Conn.
We, the undersigned members of the A.R.R.L. residing in the Section of the Division hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)
The candidates and five or more signers must be League members in good standing or the petition will be thrown out as invalid. Each candidate must have been a licensed amateur operator for at least two years and similarly, a member of the League for at least one continuous year, immediately prior to his nomination or the petition will likewise be invalidated. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, but no member shall sign more than one.

4. Members are urged to take initiative immediately, filing petitions for the officials of each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

— F. E. Handy, Communications Manager

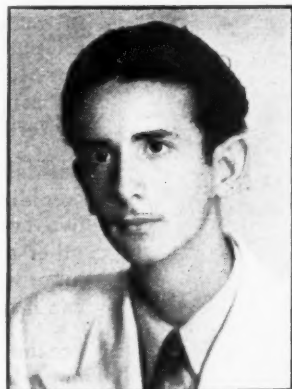
ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

North Carolina	W. J. Wortman, W4CYB	Mar. 18, 1941
Rhode Island	Clayton C. Gordon, W1HRC	Apr. 15, 1941
N.Y.C.-L.I.	E. L. Baunach, W2AZV	Apr. 22, 1941

In the Nebraska Section of the Midwest Division, Mr. Garold Bennett, W9WKP and Mr. Royal E. Olmsted, W9FOB, were nominated. Mr. Bennett received 45 votes and Mr. Olmsted received 39 votes. Mr. Bennett's term of office began April 15, 1941.

Meet the S.C.M.'s



Mario de la Torre, CM20P

One of the youngest S.C.M.'s in the A.R.R.L. field organization is CM20P of the West Indies Section. He recently reached his twentieth birthday and has been a ham since he was a little shaver back in 1931. Active on 7, 14 and 28 Mc., his lay-out includes a 6L6-TZ40-203A c.c. transmitter, SX16 and homebuilt t.r.f. receivers. S.C.M. de la Torre holds the distinction of having received a medallion in the 1938 Copying Bee and won the award for his section in the Second A.R.R.L. QSO Party. He is O.R.S. and a member of the Radio Club de Cuba. During the 1932 Santiago disaster he assisted in emergency work done at CM8BY. CM20P's other diversions are bicycle riding, swimming and tennis. He is at present preparing for entrance to the University of Havana where he will study law.

PROF
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THE HAM

THE Professional's CHOICE!



**SUPER
PRO**

*series
'200'*

PROFESSIONALS who choose "Super Pro" receivers for national defense, newspaper work and short wave rebroadcasting know they can count on them to come through at critical times. Years of association with the "Super Pro" have led them to consider it first no matter how difficult the job may be. There is great satisfaction in selecting a "Super Pro" for it is not limited to one type of service. Its great flexibility makes it readily adaptable to almost any operating condition. In addition to its many other features, the variable IF band width provides the best possible quality reproduction under any given conditions of interference.

Write Dept. Q6 for 16-page "Super Pro" booklet

H A M M A R L U N D

THE HAMMARLUND MFG. CO., INC., 424 WEST 33RD STREET, NEW YORK CITY, N. Y.

MORE FOR YOUR MONEY
WHEN YOU SPECIFY
C-D CAPACITORS WITH

HIDDEN EXTRAS

YOUR CAPACITOR DOLLAR buys more when you invest in C-D's. You get those hidden extras that distinguish the Cornell-Dubilier capacitor from all the rest. Extra stamina, extra dependability, extra long life — extra value through and through at no extra cost. Amateurs who know and through at no extra cost. Amateurs who know Cornell-Dubilier know the "reason why" of these extras—it's Cornell-Dubilier experience... thirty-one years of capacitor specialization. You can rely on C-D's every time to give you more for your money.

send for new catalog no. 185a

GET THESE ADVANTAGES
AT NO EXTRA COST IN C-D
DRY ELECTROLYTIC
TYPE BR

- hermetically sealed
- vented
- polarity clearly indicated
- extremely versatile—will fit into most cramped chassis



Get the extras AND YOU GET THE
TOPS IN CAPACITOR
PERFORMANCE!



**CORNELL-DUBILIER
ELECTRIC CORPORATION**

1013 HAMILTON BLVD. • SO. PLAINFIELD, N. J.

BRIEFS

In the 1.75-Mc. W.A.S. Party held in February, W9YYZ worked 308 stations in 40 states for a score of 61,600 points. This information was inadvertently omitted from the high scores listed on page 70 of April QST.

W9YJS has become Missouri's first "radio fire chief." The title was bestowed on him and a gold badge presented by the State Chief of the Fire Underwriters Patrol for the part played through the activities of W9YJS's station in stimulating fire prevention activities in Kansas City to such an extent that the city won a place of honor in the inter-chamber fire waste contest in 1940 after a poor showing the previous year.

A quite pronounced interest in amateur radio was created in the vicinity of Amarillo, Texas, due to the recent emergency there. The public schools were among the first to desire a better acquaintance with radio in general. Culminating a three-day series of addresses by commercial and broadcast representatives, Hal Sparks, W5HZZ, explained amateur radio, its history, study for preparation in obtaining license, difference and relative merits of radiotelegraphy and radiotelephony, the value of knowing how to handle traffic and how it played such a major part in Amarillo's recent ice storm. There was much interest in W5HZZ's talk as evidenced by the numerous questions put forth by both students and teachers.

We quote from a letter written by W9UQT, Secretary of the Central Illinois Amateur Radio Club: "Message blanks are going to be sent to Camp Forrest, Tenn., for the boys to use who are down there from our community. We think the blanks will make it easier for W4HHG. He sure is doing a yeoman job in handling practically all the traffic in the Camp. . . . That means a lot to us because about a hundred of the lads from this neck of the woods are in Camp Forrest." The idea of clubs furnishing blanks to amateur friends now operating from military camps is a very splendid gesture and one which should help considerably to increase the flow of traffic from trainees.

WOULD YOU BELIEVE IT?

ELMOT WINDBAG
FOR MAYOR

**RADIO DEALERS IN
WEST BUMP, UTAH, REPLACED
12,462 GASSY RECEIVING TUBES
FOLLOWING THE RECENT MAYORALTY
CAMPAIGN IN THAT CITY.**

UMSAY UFFSTAY
EHAY IDKAY?

**LITTLE PERCY
POPOVER, AGED 1 1/2,
CAN COPY CODE IN PIG-
LATIN, UPSIDE-DOWN,
WITH ONE EYE CLOSED
AT 35 PER.**

**THUNDERBOLTS ARE SAID TO
KEEP BETTER IN VACUUM
JARS THAN IN THE OLD-FASHION
TYPE USED BY BEN FRANKLIN
IN HIS KITE EXPERIMENTS.**

WHERE PERFORMANCE COUNTS!

THE "HQ-120-X" is widely used in amateur stations owned and operated by men who, during their work day, are designing and developing commercial equipment. These engineers are real critics when they are buying receivers for their own use. With them it's performance above all else. Craftsmanship and engineering have been combined to make the "HQ-120-X" a receiver which anyone would be proud to own. No corners were cut in its design. Inductive and capacitive trimming are employed in the R.F. circuits to assure perfect alignment, maximum image rejection — low noise level. Go over the "HQ-120-X" carefully — try it in your own shack — you will agree it's a fine performer. Write for 16-page technical booklet.



Use the "HQ-120-X"

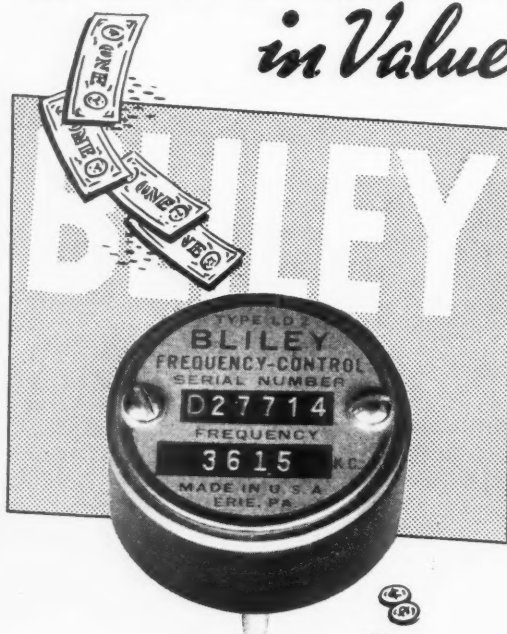
HAMMARLUND MFG. CO., INC.
424 West 33rd St., New York City
Please send 16 page "HQ-120-X" booklet.

Name.....
Address.....
City.....State.....

H A M M A R L U N D

EXPORT OFFICE: 100 VARICK STREET NEW YORK CITY

Dollars More in Value



OFTEN MEAN BUT A Few Cents More IN COST

Your price for Bliley Crystal Units could be reduced. Savings can be brought about through simplifying or eliminating certain manufacturing processes and design refinements.

Our engineers would not, however, approve such a procedure. Knowing the facts, you also would not approve. The answer is simple; those "extra" operations and attentions to details determine the final quality of the finished crystal, yet the cost is but little more.

Dollars more in performance value for a few cents more in price will always be good purchasing economy. Bliley Crystal Units are your best buy because they are precision-made for maximum value rather than produced for minimum cost. Your distributor has your copy of circular A-8, describing Bliley amateur crystals — ask for it.

BLILEY ELECTRIC CO.
UNION STATION BUILDING ERIE, PA.

Single Side-Band Receiving

(Continued from page 17)

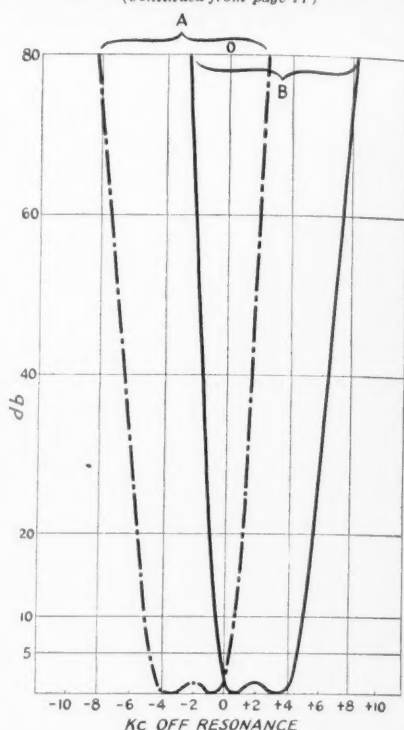


Fig. 3 — Selectivity characteristic of the band-pass amplifier in the unit shown in the photographs. The carrier is placed at one edge of the pass-band. The dashed curve is the solid curve shifted, by selecting the appropriate crystal oscillator, to pass the lower side band. This curve was taken at 455 kc. and includes the selectivity of the part of the regular receiver i.f. in use.

two crystal-controlled oscillators, to the single side-band accepted by the 50-kc. amplifier.

It is obvious that to be useful any system of heterodyne rejection must be rapid in operation, suppressing all the interference that it is capable of suppressing under the particular receiving conditions in a minimum of operating time. The selectable single side-band system satisfies these conditions. It is fast and it is effective.

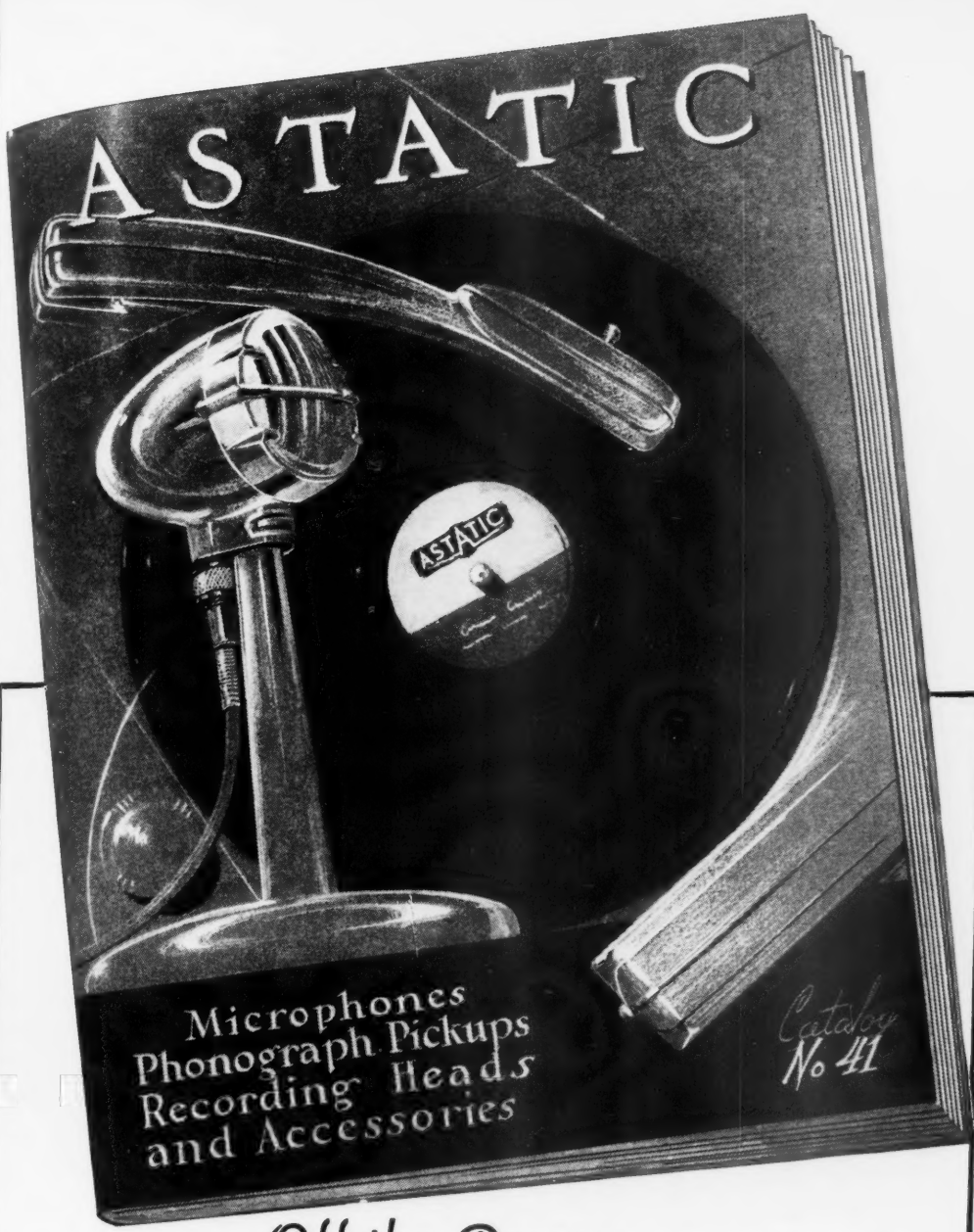
★ New Receiving Tubes ★

KENRAD announces two new receiving tubes, the 6AH7GT and the 12AH7GT. Identical except for heater ratings, these octal-base tubes are twin triodes with separate cathodes, designed for converter and audio applications. Each triode section has a maximum plate-voltage rating of 300 and plate dissipation of 2.5 watts. At normal operating plate voltage of 250, the recommended biasing voltage is 16. The tubes have an amplification factor of 16 and transconductance of 2400 umhos. Normal plate current is 12 ma. Pins 1, 2 and 3 and 5, 4 and 6 are, respectively, connected to the grid, cathode and plate of each triode section. Heater connections are to pins 7 and 8.

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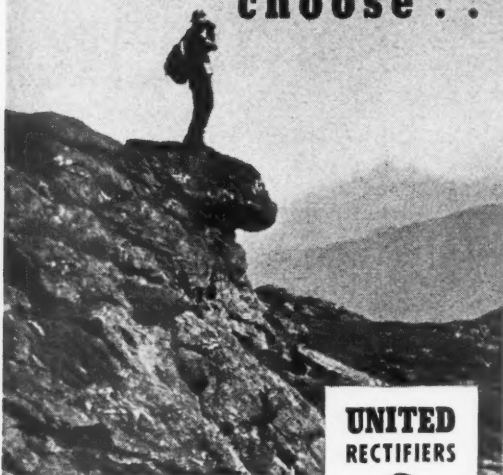
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Off the Press in June, Astatic 1941 Catalogs will be available to visitors at the Radio Parts National Trade Show and for Astatic customers and friends everywhere. See your Radio Parts Jobber or write direct.

THE ASTATIC CORPORATION
YOUNGSTOWN, OHIO

Observing individuals choose...



The real thinkers of the engineering fraternity are predominant users of UNITED rectifier tubes. The familiar styling of these famous tubes is now a hallmark of professional wisdom. Others, with a change here and a change there, come and go. Those "in the know" steadfastly insist on UNITED.

- 1. TWO TYPES TO CHOOSE FROM**—Unshielded and shielded—each has specific advantages.
- 2. GREAT SAVING IN TIME DELAY**—10 seconds initial or routine—this quality of the 966 places it in a class by itself.
- 3. FULLY SHIELDED CONSTRUCTION**—For certain applications where shielding is important, type 966A is the uncompromised solution.
- 4. NO EXCESS MERCURY**—966 and 966A have measured mercury content, preventing harmful amalgams and costly time delay.
- 5. LONG AND SATISFACTORY LIFE**—is not merely predicted, it is a matter of history.

Types illustrated interchange with 866 and 866A. Write for technical data covering these and larger types 972, 972A and 975A.

UNITED RECTIFIERS



966A \$1.50

966 \$1.20



RATINGS

(both types)
Filament
 2.5 volts, 5 amps.
Peak inverse
 10,000 volts
Plate current
 1.0 amp. peak
 .25 amps. average
Tube voltage drop
 10 volts average

UNITED

ELECTRONICS COMPANY

42 SPRING
STREET

NEWARK,
NEW JERSEY

Field Day

(Continued from page 27)

simultaneously operated transmitters used at any time in the contest period by any entrant. All units or set-ups constituting a score group are placed under the call and control of one licensee who has made the required advance notification meeting FCC requirements and who is responsible for accuracy of all logs and records.

Design your station equipment, especially exciters and receivers, for portability, connection to battery or emergency supply quickly if power fails and necessity arises. Don't deny yourself the ability and pleasure to set up in any location when radio links to agencies served by amateurs in the public interest may be needed. Surprisingly efficient and useful equipment may be operated from vibrator-type, genemotor, and battery power supplies. Gas-electric emergency power units for 300 watts or more are not as expensive as they used to be. Hundreds of amateurs have built their own very inexpensively following directions from page 26 of November, 1937, *QST* or had Dodge generator frames rewound for 110 v.a.c. by local industrial training schools for just the cost of materials.

The only purpose of the scoring system is to make it interesting to see how our work measures up with others who go afield. Group planned Field Days are interesting, constructive, and good fun. If you cannot be with a group, aim to check in for a few contacts with an individual set up. Prove emergency readiness on these dates by participation! Here's luck, and we're looking for your report.

— F. E. H.

An Inexpensive Exciter

(Continued from page 16)

condition. Start with the plates of the neutralizing condensers screwed up tight and then back off a full three turns on each condenser. This places the neutralizing capacities at approximately the correct values. Condenser C_5 is then rotated through resonance, which will be indicated by a kick in the grid current. Adjust the neutralizing condensers in small steps, turning both screws in the same direction and the same amount each time, until the grid current remains stationary when C_5 is rotated. This indicates complete neutralization. Retune the grid circuit after neutralization so that maximum excitation will be secured. It is also a good idea to recheck the coupling between L_4 and L_5 as described above, since neutralizing will change the load on the driver somewhat.

Plate voltage may now be applied to the amplifier. With the plate tank tuned to resonance the plate current should fall to 20 or 25 ma. A load such as an antenna or feeder system, or a 10-watt lamp used as a dummy antenna, may be connected and the coupling adjusted until the plate current reaches the full-load value of 60 ma. It is possible that the tube will stand more than this, but 60 ma. represents a safe limit. The grid current will fall off to 10 ma. or so when the amplifier is loaded.

The transmitter output may be fed into any

W5CXH 1939 winner Hiram P. Maxim Award as most outstanding radio amateur

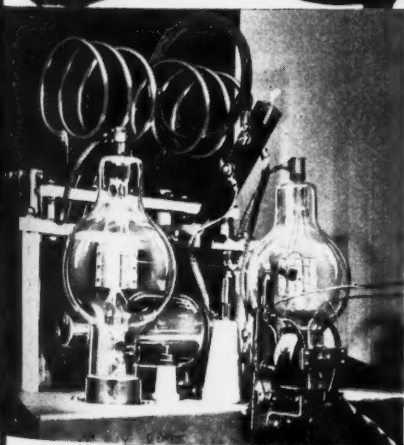
...another Eimac user

The transmitter shown has just been placed on the air by W6OGZ and W5CXH operating it jointly. The final amplifier consists of a pair of Eimac 100TH's and an Eimac Vacuum Tank Condenser in the tank circuit.



"...the 100TH's in my rig work as well on 5 meters as they do on 160"... says Dawkins Espy W5CXH

The list of achievements by W5CXH is long enough to fill this page. Reference to the August, 1940 issue of QST will give you a fair idea of his ability. The point here is that intelligent use of high quality equipment almost inevitably brings outstanding results. The choice of Eimac tubes and VC condensers by W5CXH is corroborating evidence of the oft' repeated statement that "Eimac tubes are first choice among the leading radio amateurs." Selecting equipment of this calibre is surely the first step you can make toward outstanding achievements in radio.



EIMAC REPRESENTATIVES

California, Nevada
HERB BECKER, 1530 W.
104th St., Los Angeles, Cal.

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Second Ave., Seattle, Wash.

Colo., Wyo., New Mexico,
Arizona, Utah
RICHARD A. HYDE, 4253
Quitman St., Denver, Colo.

Ohio, Mich., Ky., Ind., Minn.,
Mo., Kan., Neb., Iowa
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ING CO., E. R. Peel, 154
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R. I., Conn., Mass.

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Texas, La., Okla., Ark.
J. EARL SMITH, 2821 Live
Oak St., Dallas, Texas.

Chicago, Illinois, Wisconsin
G. G. RYAN, 549 W.
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Ill.

N. Caro., S. Caro., Georgia,
Tenn., Flor., Ala., Miss.
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St. N. E., Atlanta, Georgia.

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Frazar & Co., Ltd., 301 Clay St., San Francisco

the Leaders to

Eimac
TUBES

McCullough, Inc.
San Francisco, California

Enjoy Multi-Match Economy

Tube changes will not obsolete Thordarson Multi-Match Modulation Transformers — they are made to fit new tube characteristics.

These transformers will match all Class B plate loads from 2000 to 20,000 ohms to any Class C load from 3000 to 15,000 ohms.

Switchboard plug-in terminal board permits quick, accurate matching of tube loads.



Compound filled cases give complete protection from atmospheric conditions.

It is traditional for amateurs to use Thordarson transformers; amateurs know Thordarson's built-in safety margin gives longer operating life, freedom from chatter, and quiet efficient transfer of audio power from modulator to modulated stage.

Ask to see these transformers at your Thordarson Distributor today!

THORDARSON

ELEC. MFG. CO.

500 WEST HURON STREET

CHICAGO

ILLINOIS

TRANSFORMER SPECIALISTS SINCE 1895

type of antenna providing an appropriate matching or tuning system is used. Systems employing a two-wire non-resonant line may be coupled directly to the output coil without tuning.

At the recommended input, 21 watts (60 ma. at 350 volts), the output as measured in a dummy antenna is something over 10 watts. For modulating the transmitter 100 per cent, an audio power output from the modulator of about 11 watts is required. The modulator output transformer must match an impedance of 5833 ohms (modulated amplifier plate voltage divided by modulated amplifier plate current expressed in amperes). A 6000-ohm output winding will be close enough to provide a satisfactory match.

A.R.R.L. HEADQUARTERS OPERATORS

W1AW, A.R.R.L. Headquarters:
Hal Bubb, "Hal," Stn. Eng. and Chief Opr.
George Hart, "Geo," 2nd Opr. See others, below.

The following calls and personal signs belong to members of the A.R.R.L. Headquarters gang:

W1AL, J. J. Lamb, "jim"
W1BAW, R. T. Beaudin, "rb"
W1BDI, F. E. Handy, "fh"
W1CBD, C. B. de Soto, "de"
W1DF, George Grammer, "gg"
W1EH, K. B. Warner, "ken"
W1GS, F. C. Beekley, "beek"
W1INF, A.R.R.L. Headquarters Operators Club
W1JEQ, Vernon Chambers, "vc"
W1JFN, A. L. Budlong, "bud"
W1JMY, Joseph A. Moskey, "joe"
W1JPE, Byron Goodman, "by"
W1JTD, Hal Bubb, "hal"
W1LVQ, L. John Huntoon, "jh"
W1MFA, Harold K. Isham, "hi"
W1SZ, C. C. Rodimon, "rod"
W1TS, Don Mix, "don"
W1UE, E. L. Battey, "ev"
W3AMR, George Hart, "geo"
W9NFL, J. R. Buckler, "jeem"

Correspondence Dept.

(Continued from page 62)

crystal he is now 50 kc. further down in the mire. For all the good he is to you there he might as well be in the upper jungles of Peru with the Wenner-Gren Expedition. You'd have just as good a chance of working him.

So we opined that something ought to be done about it. (Where have I heard that one before?) Perhaps the powers that be would give us one night a year, maybe on 160, where all the real grey-bearded old-timers could drag out their quenched gaps, synes and spark coils and really open up for a rally. Like the parades these guys have with 1909 Minervas and 1911 Locomobiles and Jack Benny Maxwells. Just wind 'em up and spin 'em, for the benefit of the Young Squirts and also so we could get that heady exhilaration that ozone used to give us.

Well, we dinged that as impractical, as much fun as it might be. But we *did* work around to something much more practical, of infinite simplicity and with real possibilities.

Why not set aside, by mutual agreement, some section of either the 40- or 80-meter band — perhaps both — where real old timers could count on finding their pals? Maybe just 5 kc. would do it. The only requirements to bust in and start talkin' to be, say, 15 years on the ham bands. Call it the Old Timers' Club. Say, wouldn't it be something if you knew you could tune to a certain spot on the band any night and run into men like 9RR, 2OM, 8BDA, 4FT, 6ZAC, 5KC, 5ZA, 3ZO and a thousand others!

SEND FOR THIS FREE BOOK

Our latest issue, with illustrations, descriptions and lowest prices on thousands of bargains. Sets, parts, supplies and accessories of all the better makes. No ham should be without his NEWARK CATALOG. It's FREE! **WRITE TODAY!**

DISPLAY YOUR CALL LETTERS

Your call letters in GOLD... on your ham shack door or auto window... will look mighty fine!

10c

Big, shadowed decalcomania letters nearly 2" high. Send time for yours today. Don't forget to give your call letters.

**THE BEST AND NEWEST
AMATEUR RADIO PRODUCTS
FROM ALL LEADING MANUFACTURERS**

Always IN STOCK FOR IMMEDIATE DELIVERY

OIL FILLED — OIL IMPREGNATED FILTER CONDENSERS



AS LOW AS **59c**

Thousands now in use by "hams" who are still wondering how we can sell such dependable quality condensers at such low prices. No compromise with quality. Made by a leading manufacturer and GUARANTEED at rated voltages.

Mfd.	Volts DC.	Size	Price
1	1000	5 x 3 3/4 x 1 1/4	\$.59
10.3	1000		2.15
4.4	1500	5 x 3 3/4 x 1 3/4	1.50
2	2000	4 3/4 x 3 3/4 x 1 3/4	1.50
8	2000	5 x 3 3/4 x 3 3/4	2.75
4	3000	5 x 3 3/4 x 3 3/4	3.75

HALLICRAFTERS

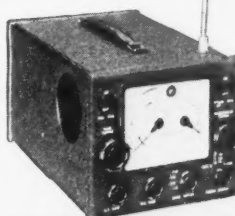
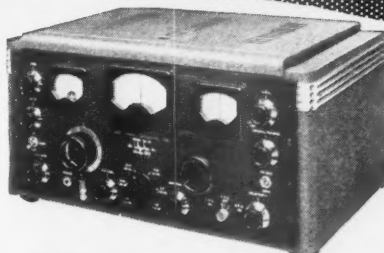
SX-28

Complete **\$159.50**

less speaker

\$15.95 Down

\$12.68 per month for 12 months



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\$14.75 Down, **\$11.73** per month for 12 months



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HIGH VOLTAGE POWER TRANSFORMERS



Newark's larger volume of amateur business makes this unmatched value possible. Made by one of the largest transformer manufacturers. These husky transformers have a place in every Ham Rig. Guaranteed. As illustrated.

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No. 4140 — 600-0-600 V. — 200 Ma. Filaments: 7.5 V.C.T.-3A. — 5.0 V.C.T.-3A. — 2.5 V.C.T.-10 A. Wt. 8 1/4 lbs. **\$2.85**

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For PORTABLE . . . MOBILE and
FIXED STATION OPERATION



"FB" reports about this new ABBOTT DK-3 radio-telephone transmitter and receiver keep pouring in. Exceptional results from this extremely LOW PRICED unit. Range varies from 2 to 30 miles depending upon terrain. Ideal for emergency communication.

★ **For BATTERY OPERATION**—Three 45-volt B batteries (Eveready No. 482 or Burgess M30) and four 1½-volt batteries (Eveready No. 742 or Burgess 4FH).

★ **For 110-volt AC OPERATION**—Use AC power supply giving 135 to 180 volts DC output. Variable inductive coupling permits use of most standard antennas.

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★ **ONLY TWO INEXPENSIVE TUBES**—6G5G as Audio Amplifier (receive) or as Modulator (transmit); 6J5GT as Super Regenerative Detector (receive) or as Oscillator (transmit).

★ **SIMPLE CONTROL**—One volume control, with on-off switch, for both receive and transmit; microphone and headphone jacks; special variable antenna coupling knob; ceramic antenna insulators; transmit and receive switch; large easy-tuning knob.

★ **ANTENNA**—Two pieces of copper or aluminum tubing approximately 17" long or an adjustable vertical antenna, required for portable operation.

★ **MICROPHONES and HEADPHONES**—Will operate with any single button 200 ohm carbon mike and any standard headphones. Hand sets should incorporate 200 ohm mike and high impedance phone.

★ **SELF-CONTAINED**—Complete in compact, grey wrinkle finish, metal carrying case with sturdy leather handle. Removable back panel for easy access. Size 11" long x 11" high x 4½" deep. Shipping weight, 11 lbs.

DK-3—List price, less tubes and batteries. . . **\$29.50**
(Subject to usual amateur discount)

SEE THE DK-3 AT LEADING DISTRIBUTORS
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INSTRUMENT, INC.

51 VESEY STREET

NEW YORK, N. Y.

80

I'm no organizer. But maybe somebody else can see some good in this idea. Let's spread it out and take a look at it. What do you creaky old men say?

— Bill Lippman, W6SN/WLYI

BLIND DATE

State Division of Forestry, King City, Calif.

Editor, QST:

I quite agree with Ethel Smith, W7FWB. The YL's should make themselves known, but I am not so sure that "they would tell."

I am a key twitcher and I find that nearly every time I connect with a YL she will let me call her "OB" or "OM" for the entire QSO, then when it is time to sign off with the usual 73 she will suddenly announce my error as if it were my fault.

I not only agree with W7FWB in that the YL's should get together, but also that the YL's and the OM's get together in a life partnership in order that not only one but both could go crazy together in peaceful bliss.

However, I never did go for a blind date. Key twitching is as blind as a bat, tonsil busting only a little better. I think I will wait for television.

— A. E. Moorhead, Jr., W6AW

Strays

W3FQH, secretary of the Western Maryland Amateur Radio Club, unable to attend a meeting because he had been drafted, made a recording of his report on the minutes and financial standing which was played at the meeting. — W3AQV.

In Walt Disney's "Baggage Busters," Goofy is able to copy the following message from a telegraph sounder which gives out pure oscillator tones and does nothing but repeat CQ's: "See that magician's trunk is put on train No. 4." Wow! — ez-W9AFY.

"In March QST, you published the story of the tower that I built.

"Several Sundays ago, we had a 65-m.p.h. gale and it blew the tower over. It lifted one of the cement legs right out of the ground, so realize that I should have set it deeper in concrete as W2JRG suggests in the April issue.

"As the tower did not break anywhere until it hit the house next door, I feel that the rest of the design was sound.

"Of course, I hate to tell you about the failure of my dream child, but feel it would be unfair to our readers not to warn them against such a flimsy foundation." — W9JWC.

W1APA, faced with the problem of carrying his portable 112-Mc. beam through hotel lobbies and such without attracting too much attention, licked it in a novel way. The three-element beam plus supports folds into a package that just fits nicely into his golf bag with the hood pulled over it. When there isn't any snow on the ground, he doesn't attract much attention!

The new G. E. Flamenol insulated wire for light and power circuits is excellent for transmitter wiring, especially for the high-current filament circuits. The insulation, which is thin enough to make a compact job possible, may be obtained in a variety of colors. The wire skins easily and is pre-tinned for ready soldering. — W9TZL.

HOW MANY OF THESE Do YOUR Tubes Give You?

1—Low Driving Power—Fewer Stages

2—Easy Frequency-multiplication

3—More Compact Construction

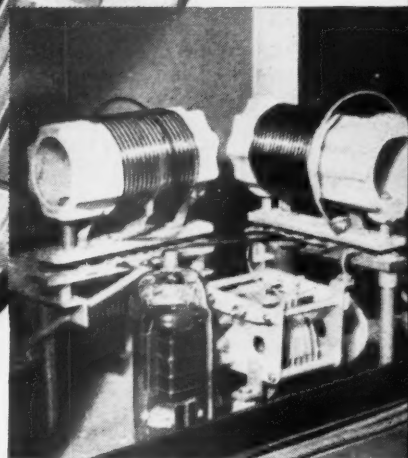
4—High Output—High Efficiency

5—High-frequency Operation

6—Quick Band Change

7—No Neutralizing

W2ACB drives his 800-watt final on 3925 kc with a GL-814.



Get Them ALL with GL-814!

GL-814—BEAM-POWER TETRODE ICAS* RATINGS

Fil. Volts. . . . 10 Fil. Amp. . . . 3.25

	Class C Telegraph	Class C Telephone	
		Plate Mod.	Grid Mod.
Plate Volts	1500	1250	1500
Plate Milliamp	150	144	60
Driving Power, Watts . .	1.5	3.2	4.2
Output Power, Watts . .	160	130	35

*Intermittent Commercial and Amateur Service

For the low-power man who wants to step up a notch or the high-power man who wants greater flexibility in his rig, the GL-814 deserves plenty of consideration. GL-814's high power-sensitivity puts you up to 160 watts (cw) with only 1.5 watts driving power. As a frequency multiplier it's great. Band switching becomes a snap. By cutting out intermediate stages you cut down on equipment required, and on transmitter size. And there's no neutralizing to worry about. Figure how GL-814's can do a job for you . . . then see or write your G-E dealer. Try G.E. and measure the difference! General Electric, Schenectady, N. Y.

GL-814 - - \$17.50

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181-S

WHERE you buy it can be just as important as WHAT you buy!

The purchase of radio gear is not a cut and dried transaction. Generally a fellow wants to know a few things that the manufacturer's literature hasn't cleared up in his mind. He wants assurance that the job he is buying will do what he wants it to do. He wants assurance that he will be satisfied.

**I PROMISE YOU ALL OF THAT . . .
and MORE**

Let me tell you all about this **New ABBOTT DK-3** **PORTABLE — MOBILE —** **FIXED STATION** **TRANSCEIVER**

that you are hearing so often on
the
2½ METER BAND



It's an **UNUSUALLY LOW PRICED** radiophone transmitter and receiver with special Variable Antenna Coupling that permits use of maximum power while transmitting, and enables flexible receiver control.

Effective range is from 2 to 30 miles depending upon terrain. It is self contained in a compact, grey wrinkle finish, metal carrying case with a sturdy leather handle. Size 11" x 11" x 4½" deep. Shipping weight, 11 lbs. The back panel is removable for easy access.

Net price, less batteries and tubes \$17.35

I cannot tell you all the desirable features in this ad. Mail a card today and I'll forward everything by return mail.

Bob Henry
W9ARA

**BUTLER
MISSOURI**

Strays

Conditions for DX on "80" appear to have been hot this spring. W1JZD and W4TM have been reported S7-8 on 75 'phone from St. Heliers, New Zealand. Does it make your mouth water?

Anyone who has built the Riee "Variarm" e.c.o. unit described in *QST* for January and who has had trouble with buffer oscillation in the middle of the 7-Mc. band can eliminate it by shunting the buffer grid-circuit choke with a 100-μufd. mica condenser. — W3GFZ.

A.R.R.L. Sweepstakes

(Continued from page 54)

SCORES

(Scores are grouped by Divisions and Sections. . . . The operator of the station first listed in each Section is winner for that Section. . . . Asterisks denote stations not entered in contest, reporting to assure that stations they worked get credit. . . . The number of sections and number of stations worked by each participant are given following the score. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates power up to and including 100 watts (multiplier of 1.25), B indicates over 100 watts (multiplier of 1). . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Example of listings: W3BES 113848-62-737-A-40, or, Final Score 113848, number of sections 62, number of stations 737, power factor of 1.25, total operating time 40 hours. . . .)

ATLANTIC DIVISION

E. Pennsylvania

W3BES 113848-62-737-A-40
W3DGM 93930-62-607-A-37
W3GHM 82045-61-538-A-37
W3GKO 80700-60-538-A-40
W3HFD 80314-59-547-A-40
W3EEW 71920-62-464-A-37
W3HLZ 67135-58-464-A-40
W3FLH 65250-58-450-A-39
W3GHD 62830-61-412-A-37
W3FRY 62620-62-404-A-37
W3IKW/3 62495-58-431-A-40
W3KT 61991-61-407-A-38
W3HYT 60783-58-423-A- -
W3DPU 58290-58-402-A-34
W3HXA 57565-58-398-A-37
W3BXE 56000-56-401-A-39
W3CRW 55970-58-386-A-39
W3GDI 54656-55-298-A-35
W3GET 54435-57-382-A-13
W8SFV 53630-62-346-A-40
W3HRW 53000-50-427-A-36
W3FGB* 51744-56-462-B-39
W3HPE 50588-57-355-A- -
W3CHH 48538-55-353-A-29
W3HJE 47310-57-332-A-36
W3AGV 42840-63-275-A-28

W3HRP 39360-48-328-A-40
W3EUC 36250-50-364-B-40
W8RJL 35905-43-334-A-37
W3HNQ 31607-47-273-A-36
W3EFH 31388-45-279-A-39
W3ENH 31165-46-271-A-30
W3ITW 30798-59-261-B-33
W3IMI 28290-41-276-A-33
W3ADE 23088-52-222-B-26
W3GOW 22440-51-176-A-32
W6JFM/3 20588-45-184-A-39
W3EWR 18480-40-231-B-35
W3FXZ 17716-43-206-B-25
W3GQW 17250-40-178-A-26
W3IDQ 16500-32-201-A-26
W3HFO 15588-25-215-A-21
W3FQG 13650-35-156-A-14
W3JN 13376-44-158-B-16
W3ARK 11132-44-127-B-18
W3HZK 9788-29-135-A-18
W3ILK 9688-31-125-A-13
W3GEW 8225-35-94-A-15
W3GGT 8132-38-107-B-23
W8LAP 7704-36-108-B-36
W3ICB 7605-30-78-A- -
W3HHC¹ 6716-27-100-A-18
W3IGP 6293-31-103-B-19¹
W3IEG 6048-28-114-B-22¹

(Contd. on page 86)



The radio amateur's handbook

THE STANDARD MANUAL OF AMATEUR
RADIO COMMUNICATION



1941

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TAL U. S. A.

The Handbook tells the things which are needed for a comprehensive understanding of Amateur Radio. From the story of how Amateur Radio started through an outline of its wide scope of the present — from suggestions on how to learn the code through explanations of traffic-handling procedure and good operating practices — from electrical and radio fundamentals through the design, construction, and operation of amateur equipment — this book covers the subject thoroughly. It includes the latest and the best information on everything in Amateur Radio.

\$1 postpaid in Continental U.S.A.

\$1.50 elsewhere

Buckram bound edition, \$2.50

American Radio Relay League, West Hartford, Conn.

Station Activities



CENTRAL DIVISION

ILLINOIS — SCM, Mrs. Carrie Jones, W9ILH — W9FIN and YZE have been called to active duty with the U.S.N.R. Era, Vice-Pres. of the Cahokia Radio Club, is now acting pres. during the absence of FIN. OAW was elected Vice-Pres. to serve unexpired term. MGI is in the Communications Dept. of the Air Corps at Scott Field. GSA's house with all his belongings, including ham equipment, burned. The Central Ill. Radio Club is publishing a very interesting monthly bulletin. ULR and LEH have new jr. ops. LLM has a 4 element beam on 56 Mc. and has been vacationing in Florida. Ex-71HH is now W9PYN. TQL and WGD are newlyweds. KA has moved back to Villa Park. RHZ and SKI are now in the Army. 7DRR/9 is off the air since he blew the 814 final. FDA is rebuilding DMJ is busy with A.A.R.S. The Tri-Town Radio Club activities are now centered on assembling emergency equipment. All other club activities have been temporarily discontinued in order that members may concentrate on the one project. HOA has new portable rig and has completed A.A.R.S. cryptography course. PNV has worked IUJ, DYV, PK, GPQ, DZL, UKU, BMH, FIC, FCM, ZBH, HNN, QYN and KQT on 112 Mc. the past month to make a total of 92 stations on this band. IHN has a new rig using p.p.-809's with 150-watts input. 8IHN, 8NIT and 8TNU are active at Ft. Sheridan. SKR is building new rig. TJJ has been called to Army duty. RLM is N.C.S. for the 1.8-Mc. 'phone Chicago Suburban Emergency Net. The Rockford gang will use a gas generator from WAAR-WROK mobile unit for Field Day. ALU is rebuilding using 6L6 in final. BPU has returned from a short visit in the West. JVC is in the Army at Ft. Knox. The Starved Rock Radio Club is getting ready for Field Day. HQH is doing excellent work as O.O. RRC will be in Denver until May. DZU is now in Kansas City. CZB has been transferred to Ft. Benning. YDJ has accepted a position in N. J. LEH received commission as Ensign in the U.S.N.R. DI has new 809 final with 100-watts input. TMI and WVC are on 56 Mc. RST and ZZD are new hams in Roseville. NJK is building modulator and will be heard on 1.8-Mc. 'phone. NCB has moved to Carthage. DUG and FGE are conducting national defense schools. KXP is working as radio operator on the Lakes this summer. AOB is active on 112 Mc. and uses horizontal antenna. MBI has a new Howard 435A and is getting a.c. portable generator going as he has no a.c. at the new location.

Traffic: W9ILH 1314 BRD 1261 JMG 1023 QKL 725 MIN 415 8IHN/8NIT/8TNU/9 358 9DUX 319 UN 247 (WLTV 19) SXL 221 VEE 185 (WLTO 28) BPU 173 UQT 174 FXZ-IHN 163 ROQ 127 BEN 113 MWL 110 RRC 100 MRQ 91 QIZ 84 YZN 81 JO 80 RLU 73 RCQ 72 HOA 68 QJ 62 JTX-DBO 53 VOQ 49 RLM 46 8EVF/9 43 9BGM 39 TZL 32 QWM 31 RRC 27 YBY-ODX 24 LNP-JYF-MNR 23 PNV 22 ARN 21 RBR 17 BRY 16 ALU 14 NGG 12 RT-AOV 9 FIF 8 NIU 7 MWO-CUT-MKS 6 HQH-BPN-GBT 4 JVI 2 NNT 1 QIL (WLMW 889).

INDIANA — SCM, Harry B. Miller, W9AB — 2KHA/9 is now W9SAG. BYI has the old traffic urge. DGA rebuilt the whole rig and got a new bug. DZC has a new 60-foot self-supporting tower almost built. EGQ is having a swell (?) time with his new auto-key. EEE says the new v.f.o. helps the 25-watter a lot. HNH is new E.C. for East Chicago. HUV gets out on 56 Mc. but can't hear anyone! JUA gets 500 watts past the bel. JYX is an active O.P.S. again. KBL has a new receiver. LG visited Johnny Reinartz while in Washington. LPQ and CZD are getting ready for Field Day. PQL has been called to service. QG is laying plans for Indiana A.A.R.S. picnic at Purdue. ABB visited the S.C.M. recently. ARO has a new v.f.o. BJT is a new ham at Mishawaka. CNJ of the Wabash Valley 56-Mc. gang, has been transferred to Missouri. DEE has a new NC81X. DJJ's antenna balloon was riddled with rifle bullets! DKP is new at Morristown on 1.75-Mc. 'phone with 100 watts. ENH has new antenna up at last. FXI is having a battle with key clicks. GCE is working on A.M.C. HKR is new O.R.S. HPQ has special QSL's he sends to anyone who works him as portable W1 at the Boston Navy Yard. IWN has put his 28-Mc. final on 56 Mc. CII is new E.C. for South Bend. IYS has a new YL second op. JHQ dropped in on the S.C.M. recently. Fred is active on 3.5 Mc. again. LSZ has regular

schedule with MTZ back home in Marion. MTZ is new E.C. at Marion. NVA is new E.C. for Richmond. QEL bought LHR's rig. RDC is changing to an HY51Z final. RVU is a new ham at Kokomo. SEO is new E.C. for Hamilton county and is moving to Westfield. TBM is new E.C. for Fort Wayne. We understand Fort Wayne is doing some very fine emergency and planning work. WOD reports NAA back on 7 Mc. YCF is new E.C. at Auburn and did some nice work in the R.C. test.

Traffic: W9KHA/9 11 AXH 4 BYI 12 DCW 15 DGA 24 DOK 56 DZC 46 EGQ 118 EEY 19 EHT 50 GMJ 26 HNH 70 HUV 73 JUA 10 JYX 107 KBL 75 LG 18 LPQ-MFD 5 NXU 10 PQL 20 QG 82 (WLHL 251) SVH 76 VCO 2 YMV 1 MDJ/EZ (WLHM 145) 128 YWE 34 SWH 19.

KENTUCKY — SCM, Darrell A. Downard, W9ARU — W9CNE is moving back to Radio City. KQG is in Indianapolis and will report in KYP from there. MMY is KYN's most regular attendant — and is now O.R.S. MWR says minding the baby and handling traffic at the same time is too much! JBB is a new station in Morganfield. SEV, ex-JNC from Glasgow, is now located in Frankfort. Remember when you couldn't get traffic into Frankfort? SEV, LAK and FQK are all in that city and one of them seems to be on all the time. LOY is a 14-year-old ham in Mayfield. GPA says a deposit box in an old ladies' home collects a lot of originating traffic. TLZ is in Norfolk and advises the boys to learn copying on a mill as that's the only way the Navy will have it. BAZ will give a prize for best attendance on KYN, so go to it fellows. NAR, incidentally, runs MMY close second in KYN attendance. JIT reports traffic easier to get since he advertised a little among the students. Field Day will find Louisville's two radio clubs, the G.A.R.C. and A.R.T.S., in the field doing their stuff. YPR was sixty-three on his last birthday and has been dispatching trains on the Southern for thirty-six years. YQO and ZKW are brothers and each has a complete station in adjoining rooms! Bet they have never worked each other. Hi!

Traffic: W9NAR 61 JIT 67 BAZ 237 EDQ 465 GPA 168 BEW 24 CDA 19 WMI 8 KQG 87 MWR 77 ARU 179 MMY 57.

MICHIGAN — SCM, Harold C. Bird, W8DPE — Michigan Eight's: VQN is a new reporter this month. UJJ is also a new reporter with a good traffic total. IHN/9 reports from Ft. Sheridan. TQA is really going to town now. UGR has done a very excellent job in handling his work for M.A.R.E.C. CW reports proteges VRQ and VHQ will be on the air soon. Mac is also making recordings of various fists on the networks. He will send you yours if your sigs are strong enough and you mail a stamp to cover postage. MCB is new E.C. for Northwestern Detroit and promises to be very efficient. He has several U.H.F. rigs as well as L.F. rigs to handle things with. UFH made BPL on deliveries. DSQ manages to handle a little traffic. SKQ is now in Camp Roberts, Calif. SCW is taking Bill's place as mail man for QMN. DED is on 2025 kc. and would like work you fellows. UES is thinking of coming on QMN. We'll be glad to have you with us, OM. FX will have the old spark set going and will show it at hamfest. Tate is doing a fine job on QN. For your QMN xtals contact him. TBP has changed QTH and now lives near DAQ. GQZ is back home again at Maybee, Mich., and we expect to hear him on QMN. UQD is now O.P.S. at Owosso and is doing very fine organization work. TJR is playing around with u.h.f. UXS is doing okay at Lansing. CLL is thinking of closing the fast net on April 25th, but we would rather see it continue all summer on the present schedule. SKO has O.P.S. back again. OCC says Jackson hams becoming more interested now that Wendall is E.C. We're very pleased to hear that. SLJ is now running 70 watts. UCG has a new power supply and speech amp. How about QMN, OM? SWG is handling some traffic from the Kentucky net. DK is still running his schedules. SAY is trying to line the boys up for M.A.R.E.C., but finding it tough going as they don't seem to realize the importance of it. FTW is still going strong and reports via radio. ABH doing fine job in spite of his poor operating conditions. DBP is doing a good job on the net. JUQ reports via radio. UKB is a new reporter. DAQ makes the trophy again this year. Our congratulations, OM. RYP did a fine job on Red Cross Relay. VSK is all set with O.R.S. KZZ is a new E.C. and really taking the job to heart. CPY is back with us again. AIZ did a wonderful job on Red Cross relay. WF reports for first time in a long time. MM sent local chapter Red Cross message almost direct to St. Louis in a few minutes on April 4th. TMN is experimenting with a 112-Mc. rig now with fb results. UCG is rebuilding his rig in spare time to get on the air for regular schedules. QZV is working rig

from Camp Livingston. SWF is working hard on his W-8 28-Mc. net, QMT. VUK reports VTT and VUK new hams in Jackson. QMN?? EGI is taking a C.A.A. radio job in Huntington, W. Va. TVE has a new Sky Buddy receiver and is working the high end of 3.5 Mc. How about QMN? Michigan Nines: GQF is back with us again. He would like to contact some of the gang on QWN Net. YYA is doing excellent job with O.B.S. Did you have a good time at hamfest? Do you know what M.A.R.E.C. is now? If you don't, contact the various officials whom you saw at the get-together and get going with your council. Let's see some activity on your part. Thanks for past cooperation, but we need lots more. 73 — Hal.

Traffic: W8WF 19 MM 1 TMN 46 GHV 206 AHV 11 LKV 15 EGI 2 AMS 6 FX 37 UGR 45 CW 38 MCB 2 UFH 324 DSQ 10 PP 40 SCW 201 DED 12 TBP 10 UQD 32 TJR 14 UXS 51 CLL 232 FWU 22 OCC 19 DPE 118 SLJ 28 SWG 21 DK 14 VMC 4 VQN 8 UCC 16 DTJ 20 IHN/9 288 TQA 41 SAY 442 FTW 34 (WLTJ 6) ABH 111 DBP 200 NGC 106 PXF 65 JUQ 9 URM 11 TPB 4 CYX 12 UKB 11 VSK 17 PQB 8 RJC 44 TKB 27 KZZ 111 DAQ 337 (WLTG 16) RYP 144 UFD 15 CPY 20 MYG 4 PSY 36 W9GQF 12 HK 7 YYA 295 GJX 859.

OHIO — SCM, E. H. Gibbs, W8AQ — It seems as if this report starts off every month by saying that W8SJF made the BPL again. It's so — she did. The lower part of a new mast at CBI is now in place. HEQ died March 21st, and Dayton loses one of its oldtimers. NAB was off the air two weeks doing some work on his house, but managed a good total. New O.R.S. are CXN, Findlay; HDL, Mansfield; TWP, Lakewood. HDL, until lately TLK, got his old call back. DAE spent two weeks vacation in Florida. LVU has been transferred to Toledo. TGU has taken over the post on trunk line "M." VGV got his rig on 14 Mc. and works out well with 40 watts. VTA, new ham in Lakewood, has joined the Navy. OPG has been transferred to Ft. Riley, Kansas. TWP has new 3.5-Mc. antenna. NZI moved to Lakewood. OD is now a First Lieutenant in Coast Artillery School, Ft. Monroe, Virginia. The Zanesville gang is going in for u.h.f. work this summer, with INS, KVS and TGU building rigs now. STQ and UFG apply for O.R.S. SHD has moved to Dayton, Ky., so Ohio loses a good O.R.S. to our neighbor. Hams with big cow pastures take note: JFC has just bought a Piper Cub plane. Cuyahoga Radio Association held their annual dinner and hamfest April 19th. Greater Cincinnati A.R.S. held their annual boat ride the same date. QBF is looking for contacts with 56-Mc. mobile rig in his car. JXM has new speech amp. and is building 56- and 112-Mc. converter. TRX and STZ have joined the Ohio River Net. EQN is another of our boys who vacationed in Florida this winter. OXF has moved to Beckley, W. Va., and resigned as E.C. for Fairfield County. OVL built a steel cabinet for the transmitter and says it is suitable for any man's parlor. Thanks to our Emergency Coordinators and all others who helped make the Red Cross test a success.

Traffic: W8SJF 713 CJL 270 TGU 198 CBI 146 NAB 108 TWP 103 SHD 92 NAL 79 TMA 77 RN 72 GTA 73 OOH 67 HDL 54 QBF 52 CUF 46 GAV 40 UUV 32 JXM 31 LCY 30 OVB 26 PUN 21 RMA-ROX 21 JKG 24 DAE 19 CXN-AYS 18 SQW 15 ODF-EQ 14 LVU-WE 13 PCW-SFI 12 RLR 11 BEW 10 BFB-AQ 7 TRV 6 TSF 4 QJJ-NDN-RVL 3 VGV-AVH-KNF 2 OD-UZJ-AXR-NDF-EQV 1.

WISCONSIN — SCM, Aldrich C. Krones, W9UIT — State Net: 3775 kc., daily 9:00 p.m. W9ONI N.C.S. Have been receiving requests for O.R.S. in increased numbers. Don't forget to show interest in traffic work by reporting into QWS at 9:00 p.m. W9QZV, new O.P.S. at Wentworth, Wis., plans an increase in power. DXI tried to tighten guy wires on his antenna and pulled down the whole thing! GZZ has a 10-P rig on QWS net. GDD wants to know how to raise modulation without causing splatter. PSA will soon be on QWS Net. ONI says thanks for cooperation from all QWS members. Let's see if we can really get a net going in Wisconsin. DIR, new O.R.S. at Portage, is really digging in and going after traffic. Keep up the good work, Frank. IRN is interested in QWS and has had 35 w.p.m. certificate for some time. IXR had a notice in the local paper that he would accept messages for soldiers at camps. In a short time he received 11 messages. GMT, formerly of Chicago, will soon be active at Rice Lake. OEB has been active in A.A.R.S. MRU and NJU are officers of the "Megacycle Mates" Club at Watertown. The club was organized several months ago and meetings are held weekly. The "Lighter than Air Net" (Milwaukee balloon antenna enthusiasts) met at the home of GPI. A good time was enjoyed by all. ODN is in the Army and stationed at Phoenix, Ariz. RSA received his class A

ticket. NHC, LGO and JWT were recently inducted into the Wisconsin State Guard. OLP is a new ham at Darlington. OMU/9 is new ham at Platteville. QFO is active on 7 Mc. again. SHN trying for W.A.S. on 3.5 Mc. with 20 watts. IGC, new O.P.S. at Rhinelander, reports the organization of a new club there. EER is active in QWS. HJL has been experimenting with emergency power rigs. RKL is a new ham in Oshkosh. W5BTL, who has been operating portable in Milwaukee on 28 Mc., has been forced to close down because of F.C.C. order No. 75. DIJ had wonderful cooperation from the Milwaukee chapter of the Red Cross. Many of the small chapters failed to mail in their message so Ollie went down to the local chapter and they called each delinquent chapter on long distance 'phone and got the message. Wisconsin Valley Radio Assn. elected the following new officers: FZC, Pres.; RQM, Vice-Pres.; RNZ, Secy.; FEO, Treas. They will use the call W9RQM in F.D. The new Club taking in Marinette, Wis., and Menominee, Mich., is called the Interstate Amateur Radio Club. They have nearly 40 members. PBG is on 3.5-, 7- and 14-Mc. c.w. with 15 watts to a 59 final. NYM has been reporting into QWS regularly. Wish more E.C.'s would do that or get one of their assistants to do it. JWT is new O.R.S. at West Allis. CJX, former O.P.S. in Rochester, Minn., is now O.P.S. at Wisconsin Rapids. YYZ objects to the statement we made about RBI being at the key of YYZ during the 1.75-Mc. W.A.S. Contest. We take it all back. It was an error on our part. FEO is doing a fine job of A.E.C. organizing in Wausau. The Milwaukee Club will have two groups competing against each other in the F.D.

Traffic: W9VDY 271 DIR 87 ONI 72 (WLTN 16) SZL 66 (WLTG 11) OEB 48 EER 33 HUJ 29 VGT 21 OEF 16 PBG-NYM 15 EYH-FEO 16 IXR 11 QFO 10 IGC 8 SHN 9 UIT 12 QZV-IRN 5 RQM-NMH 4 JWT 7. (Feb.-Mar.: W9VDY 342).

DAKOTA DIVISION

NORTH DAKOTA — SCM, Anton C. Theodos, W9WWL — How about some news and activity reports, fellows? Your S.C.M. has not received any for three months, so how's about it? W9ERR has a new job and moved to Gallup, N. M. NBX, xyl of ERR, is copying press at KLPM and will leave for New Mexico. ZHW moved to Oklahoma. RPB is a new ham in Bismarck and has a Stancor 10P. IBW has a new e.c.o. RBS is a new ham in Bismarck and has an HT6. OCI and NYE, new hams in Williston, have moved. GMY has a new SX24 receiver. Let's have some news from the c.w. boys also.

SOUTH DAKOTA — SCM, Ernest C. Mohler, W9ADJ — R.M.: 98EB. P.A.M.: NIYN. ILL is operating on TL "G." IQD is getting equipment prepared for Field Day. DZD is stationed at Fort Meade. HKX is rebuilding. FSX put up new sky hook for 1.75 Mc. BAE works DX on 1.75 Mc. OXU is trying out 1.75-Mc. 'phone. The Sturgis gang has organized the Mt. Rushmore Radio Club with KTS as Pres., 7DPK-9 as Vice-Pres. and KEE as Secy.-Treas. They plan to pack-rat gear to the top of Bear Butte for Field Day. RWX got a big bang out of first QSO on 1.75-Mc. 'phone. BLK is driving an RK12 on 7 Mc. with e.c.o. SAT is a new call in Aberdeen. CYG is attending school in Omaha. GLA lost high voltage transformer, but hopes to repair it. HYH moved to Sturgis. FWX is attending School of Mines and operating portable. APT has set up a station at Camp Claiborne and has made schedules with the Rapid City gang. AKO has moved to Great Falls. JKD and ADJ are experimenting with light beam transmission. VOD has a new rig going, using T40 final, says 'phone plans out indefinitely. YQR is rebuilding for 1.75-Mc. 'phone. The Mt. Rushmore Radio Club is conducting a code practice broadcast in conjunction with the A.R.R.L. code program. Reports indicate that the Red Cross Test was handled with efficiency and dispatch in this Section. Thanks to all Emergency Coordinators and others who assisted in getting the messages through. 73 — Clyde.

Traffic: W9SEB 393 BLK 149 ZWL 132 ILL 123 NJH 66 KTS 44 LUS 41 GLA 25 WUU 22 VOD 17 ADJ 14 KYZ 12 YOB 10 GCP 4.

NORTHERN MINNESOTA — SCM, Edwin Wicklund, W9IGZ — W9EKT was host to the MIN-DAK Radio Club. 45 were there. FUL has X.E.C. and pair T40's final. NYI now gets power from R.E.A. power lines. SFF is active on 3.9- and 14-Mc. 'phone. BCT is pounding brass on 3.5 Mc. EHO, one of our traffic men, has now been a ham 20 years. DNY is active on TL "A" and M.S.N. CUE has a 25 w.p.m. code certificate. PPK rebuilt rig to 809 final

(Continued on page 92)

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(Contd. from page 82)

W8OML 5405-23-95-A-14
W3CDY 4830-23-86-A-29
W3HHS 4608-19-97-A-22
W8GV 4224-33-64-B-20
W3AKB 3220-23-56-A-6
W3AOC 3128-23-68-B-4
W3CWQ 2580-16-65-A-14
W3IMW 2530-22-46-A-14
W8SNZ 2150-25-86-B-5
W8UQM 1449-19-31-A-11
W3EON 1273-19-34-B-—
W3DRO 1000-16-25-A-3
W3AKG* 810-15-37-—
W3NPF 792-10-33-B-7
W3G8X 700-14-20-A-—
W3FTQ* 360-10-18-—3
W3GRS* 195-6-13-A-1
W3HDX 140-7-8-A-—
W8FDA 90-6-6-A-—
W3IXD 75-3-10-A-5
W3GYL 63-5-5-A-—
W3IUD* 2-1-1-B-—

Md.-Del.-D. C.

W3FQZ 64089-59-436-A-37
W3FIO* 52223-61-34-A-40
W3HQU 45264-49-373-A-39
W3FSP 42930-54-319-A-39
W3DRD 41550-60-277-A-36
W3HQU 24375-50-195-A-22
W3HTK 20700-46-180-A-22
W3FDJ 20405-55-186-B-29
W3ISF 13490-38-142-A-34
W3LJI 9075-30-120-A-35
W3HDV 6000-30-102-B-14
W3RIO 2850-20-57-A-23
W3IEN 2848-34-67-A-12
W3ABV 2282-22-42-A-9
W3OZ 2100-21-50-B-5
W3AKR 1995-21-42-A-11
W3ILC* 1594-17-40-A-8
W3CDQ 1008-12-42-B-6
W3FFN 416-13-16-A-5
W3GWM 315-9-14-A-7
W3EKZ 32-4-4-B-1
W3DRE 30-3-4-A-4

Phone

W3EQK 30-5-6-B-1
W3AQV* 24-3-4-B-—

Se. New Jersey

W3FXV 37102-51-291-A-40
W3IVI 23275-49-190-A-35
W3DAJ 20378-46-222-B-22
W3TL 19632-48-205-B-35
W3BEI 12000-40-150-B-30
W3HOJ 10500-35-120-A-30
W3SJ 8600-32-110-A-22
W3HUZ 7117-39-73-A-19
W3GIG 3720-30-62-B-15
W3HLV/3 3465-22-63-A-7
W3HAZ 3420-24-57-A-10
W3GHR 3188-17-75-A-12
W3GCU 1552-18-35-A-7

Phone

W3HDJ 22410-54-415-B-32
W3GPU 3848-26-74-B-28
W3BVE 611-13-28-B-13

W. New York

W8DZC 54450-60-363-A-40
W8ORU 26772-46-294-B-38
W8EBR 22188-43-261-B-31
W8AQE 22145-43-206-A-40
W8NEY 17750-50-142-A-29
W8OCP 14000-40-142-A-29
W8TXB 12862-42-153-B-28
W8AN 12309-43-116-A-21
W8UXT* 8778-33-133-B-16
W8RKM 6875-25-110-A-11
W8VFI 6588-31-85-A-11
W8FYH 6548-27-97-A-21
W8SFD 4390-22-80-A-18
W8TXL 4225-26-66-A-28
W8QKM/8 3768-24-79-B-13
W8LCT 2655-18-60-A-10
W8URS 2650-20-55-A-11
W8DTV 2338-22-43-A-9
W8OCY 2272-18-52-A-13

W8SWB 1121-43-36-A-9
W8UXG 863-15-23-A-8
W8JIW* 209-11-19-—
W8QQM* 2-1-1-—
W8BHK* - -58-—
W8TWS* - -41-—

Phone

W8ACY 14575-53-138-B-23
W8APK 192-8-12-B-3
W8RYM 113-5-9-A-3
W8SOT* 16-4-4-—

W. Pennsylvania

W8OKC 87885-60-600-A-40
W8KUN 73316-57-515-A-40
W8IYI 32508-54-301-B-40
W8OJS 21510-45-244-B-37
W8RAP* 21275-44-200-A-37
W8NCJ 21550-47-180-A-15
W8UWZ 17928-35-205-A-37
W8NWW* 17264-52-166-B-—
W8HSN* 16718-42-160-A-24
W8RWJ 14678-38-155-A-27
W8TOJ 10865-34-129-A-36
W8YA 8325-37-113-B-9
W8JMP 6552-36-91-B-—
W8SNA 5653-34-64-A-23
W8KVR 5478-33-86-B-—
W8TNG 5298-26-84-A-18
W8JSU* 5240-26-80-A-5
W8NUG 5062-27-75-A-15
W8ZU 4900-33-60-A-23
W8KXP 4814-29-83-B-8
W8AIW 3450-23-61-A-15
W8NRB 2875-23-50-A-10
W8RFR 2323-23-52-B-7
W8UCV 1519-15-41-A-28
W8MTK 1225-20-25-A-11
W8MIZ* 1078-16-27-A-6
W8NRE* 659-17-31-A-5
W8TIB* 494-13-19-—
W8TFI 300-10-15-—
W8TUD* 280-10-14-—
W8TWT* 40-4-5-B-3
W8QVJ - -88-—

Phone

W8HMJ 3938-25-63-A-19
W8BWP 3290-28-47-A-—
W8RBJ 1805-19-48-B-9
W8RDU* 32-4-4-—

CENTRAL DIVISION

Illinois

W8BRD 80365-61-586-A-40
W8YFY 81750-60-545-A-40
W8UTB 73588-58-508-A-40
W8ERU 72198-63-573-B-39
W8GFF 71700-60-478-A-39
W8MUX 70615-58-488-A-40
W8MGN 65550-60-439-A-39
W8PKW 64743-58-450-A-39
W8TFY 64525-58-451-A-38
W8NST 63055-61-415-A-34
W8AOB 61803-59-423-A-39
W8DUX 61040-56-545-B-40
W8WEN 60180-59-410-A-38
W8YWQ 56296-62-454-B-38
W8YTV 54180-56-388-A-40
W8FOI 52853-54-392-A-34
W8GY 48360-62-312-A-26
W8QJR 39216-57-345-B-40
W8IBC 35438-54-265-A-32
W8NMY 35033-51-265-A-32
W8TH 31250-50-250-A-30
W8JO 28875-55-210-A-24
W8FAQ 25746-43-241-A-28
W8AGM 25573-53-193-A-32
W8TKN 25500-48-215-B-32
W8CKA/9 23968-56-215-B-33
W8EUV 23000-40-241-A-17
W8DSO 19646-47-209-B-20
W8NQI 19635-42-189-A-30
W8OBW 19305-39-150-A-16
W8IYA 18620-49-153-A-33
W8QDG 18400-46-164-A-30
W8CEO 17136-42-205-B-27
W8EUL 15631-41-153-A-24
W8IFA 14083-43-131-A-22

¹ Two ops. ² W3HHC, W2LKK. ³ W3FIO opr. ⁴ Two ops. W8RAP, W8UHP. ⁵ Two ops. W8HSN, W8HGG. ⁶ W8UUM opr. ⁷ Starved Rock Radio Club, W8NGC opr. ⁸ W8KPL opr. ⁹ W8YX Operators Club, six ops. W8SDX, W8NTC, W8SNL, W8ODV, W8LQA, W8TWD. ¹⁰ Two ops. W4AGW, W4FWP. ¹¹ Two ops. W2DJE, W2IZC. ¹² HQs staff members not eligible for awards. ¹³ Alma Radio Club, W6QLN opr. ¹⁴ Stanford University Radio Club, W1DMV opr. ¹⁵ Charles D. Harris opr. ¹⁶ Greensboro Radio Club, eight ops. W4CS, W4GGT, W4AIT, W4AGD, W4AEL, W4EIV, W4AJT, W4BHA. ¹⁷ W6H2T opr.

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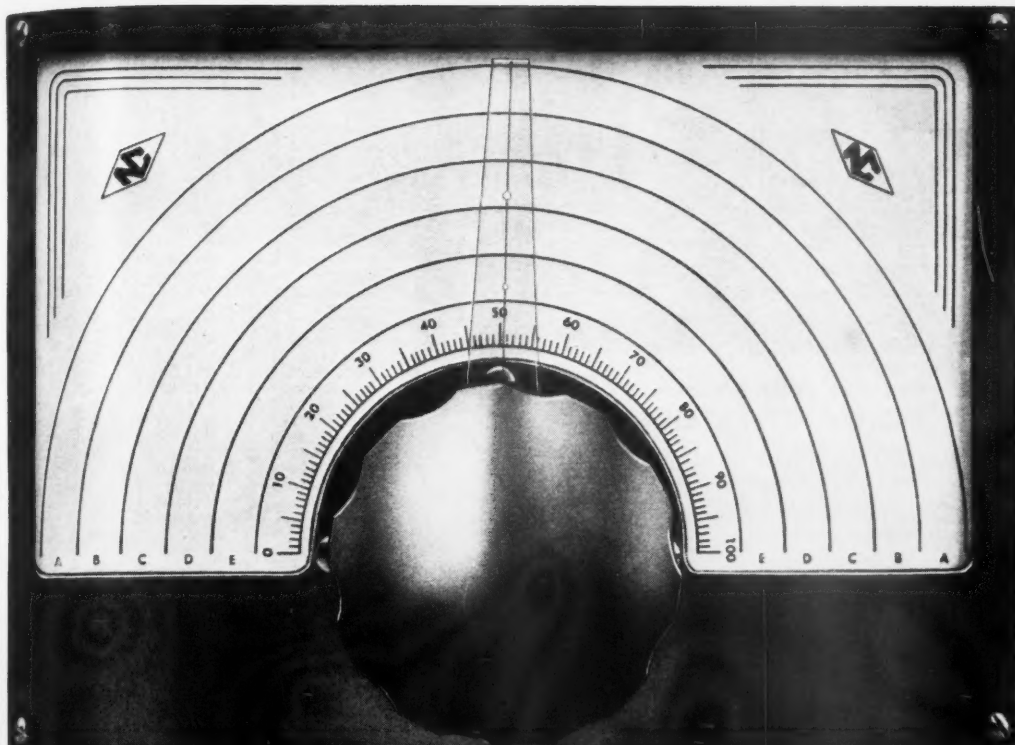
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W9HLS	11000-44-125-B-35	W9HKP	718-13-23-A--
W9ABH	10850-40-110-A-24	W9BNB/9	700-12-25-A--
W9VOQ	10045-45-98-A-8	W9ILU	510-8-26-A-28
W9FIN	9990-37-108-A-22	W9EHT*	12-2-3--
W9ERX	9880-38-130-B-27	Phone	
W9ZOG	9860-34-116-A-6	W9GWL	3599-31-65-B-14
W9MWO	9528-37-103-A-21	W9EFW	2816-22-61-B-8
W9JMG	9405-36-107-A--	W9DJU	144-6-12--
W9HGV	9181-41-115-B-17	Kentucky	
W9GDI	9000-45-100-B-12	W9FS	108963-62-703-A-35
W9IVD	8120-35-117-B-20	W9ZWR	59150-58-410-A-40
W9RTA	7290-27-110-A-19	W9GTR	24725-43-230-A-31
W9UXO	7200-36-100-B-18	W9TLZ	22400-40-224-A-27
W9NVW	6510-31-86-A-13	W9OMW	16198-31-212-A-26
W9HNM	6210-36-69-A-29	W9L BX	12682-37-139-A-29
W9QBA	6038-35-69-A-12	W9ZTU	2072-14-74-B-12
W9AGV	5380-28-77-A--	W9YGR	1623-22-30-A-5
W9OD	5115-31-83-B-17	W9NYW*	766-17-18-A--
W9BWN	5040-24-85-A-16	W9UUR	310-8-17-A--
W9CEV	4906-25-79-A-14	W9JOE	125-5-11-A-4
W9IQT	4698-29-82-B-14	Phone	
W9LL	4515-28-65-A-15	W9YQN	42539-59-363-B-38
W9YDQ	4063-25-65-A-16	W9ELL	14628-16-159-B-19
W9GRB	3990-21-79-A-18	W9FVF	8050-28-115-A-30
W9VBI	3965-26-61-A--	W9ZKW*	1581-24-33-B--
W9FVU	2700-20-51-A--	W9FZM/9	260-10-13-B-1
W9ERA	2580-24-43-A-12	Michigan	
W9VLT	2400-20-49-A-11	W8JVI	52066-53-404-A-38
W9HXO	2363-15-63-A-26	W8LEC	45780-60-382-B-40
W9ENQ	2093-27-62-A-6	W8SVC	39875-55-364-B-38
W9FMP	1943-21-40-A-9	W8FTF	36099-63-290-B-36
W9JKN	1916-21-37-A-6	W9EXW	37574-61-267-B-40
W9TAL	1750-14-50-A-11	W8NIX	27140-59-231-B-27
W9MRQ	1700-17-40-A-13	W8DAQ	26898-53-203-A-20
W9MSX	1553-18-35-A-8	W8KPL/8	26688-50-214-A-40
W9CEY	1508-18-35-A-16	W8VGC	21775-51-171-A-20
W9KWU	1425-19-29-A-4	W8UFH	19013-39-197-A-24
W9SLX	1372-14-49-B--	W8OQF	18300-61-150-B-22
W9MKS*	1334-11-49--	W8SJV	13612-33-118-A-26
W9UN	1320-16-33-A--	W8UWJ	10812-39-140-B-22
W9CZS	1305-18-30-A-5	W8UKB	9800-28-141-A-22
W9RBR	1251-17-30-A-4	W8TRN	8601-36-120-B-35
W9END	1220-16-31-A-4	W8SPF	6105-33-75-A-12
W9NGG	1200-15-32-A--	W8DDJ	6080-38-80--
W9GAV	963-11-36-A-8	W8TWC	5880-28-81-A-10
W9FIC	870-15-29-B-7	W8AIZ	5031-23-91-A-17
W9BPU	825-11-30-A-5	W8SLW	4447-30-62-A-19
W9QMJ	765-12-55-A-13	W8UTC	3650-20-90-A-27
W9PAE	763-10-31-A-5	W8FPK	3575-26-56-A-9
W9IAH	578-11-21-A-7	W8UUU	3406-25-55-A-22
W9ARM	413-11-15-A-8	W8SWA	3375-20-68-A-11
W9TLC	338-9-15-A-2	W8TZE	3202-21-64-A-23
W9HOA*	300-10-13-A-5	W9YYA	3150-24-53-A-15
W9FKV	230-8-12-A-4	W8SCA	2530-23-110-B--
W9QLZ	210-6-14-A-3	W8UFD	1913-17-45-A-20
W9ZEM	123-7-7-A-2	W8TKW	1828-17-43-A-10
W9BIN	113-5-9-A-4	W8TRP	715-11-26-A-12
W9NAB	20-2-5-B-2	W9FSK	715-11-26-A--
W9HQH*	10-2-2-A--	W8SHN	700-14-20-A-9
W9TCK	5-1-2-A-1	W9QDU	408-12-17-B-1
W9HGQ*	2-1-1--	W8SFA	32-4-4-B-1
W9JAU	1-1-1-A--	W8TBU*	12-2-3--
Phone		W8SAD*	--47--
W9NDA	37504-64-293-B-40	Phone	
W9KMN	19388-55-141-A-29	W8EMP	22040-58-191-B-39
W9VFZ	10911-43-102-A-18	W8JAH	20776-53-196-B-37
W9NAB	3069-31-50-B-11	W8SJI	7372-38-100-B--
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W9MWJ	810-9-47-B-11	W8MCB	5928-39-76-B-16
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W9OAW	450-9-20-A-5	W8KNP	2444-26-47-B--
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W9NSE	105-3-14-A--	W8SLW	23-3-3-A-1
W9CEO	24-2-6-B-1	Ohio	
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W9QMJ	10-2-2-A-1	W8HGW	92110-61-604-A-38
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W9JSL*	4-1-2-A--	W8BTI	67270-62-434-A-35
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W9BGH*	2-1-1--	W8STDN	57500-60-391-A-40
Indiana		W8YX*	57120-60-476-B--
W9KBL	50018-57-351-A-40	W8OPG	55050-60-371-A-38
W9ENH	37625-50-301-A-39	W8SLH	53200-56-385-A-40
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W9EGQ	26265-51-210-A-26	W8ROX	48600-54-365-A-32
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W9AMM	18200-50-183-B-20	W8LFE	42120-60-352-B-32
W9KAQ	16200-45-180-B-14	W8MOA	41250-55-302-A-38
W9GSQ	8100-40-81-A-26	W8CED	36722-61-301-B--
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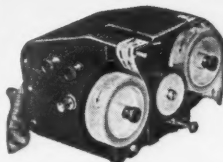
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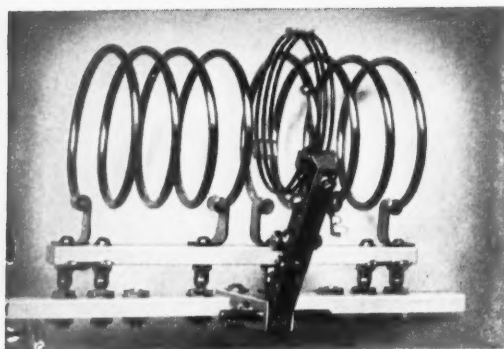
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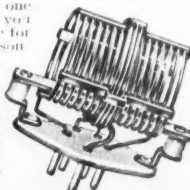
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W8BMX	33060-55-500-B-33	W9RPW	32529-53-249-A-34
W8BCE	30480-48-254-A-27	W9GWK	32156-49-264-A-34
W8BFB	27848-47-237-A-28	W9KXK	23638-53-223-B-29
W8UW	23678-41-234-A-34	W9BSS	22753-38-240-A-31
W8RSW	20816-39-215-A-30	W9HRT	19278-51-191-B-27
W8TWP	20694-43-194-A-30	W9FZC	15375-41-150-A-23
W8GDI	20538-63-163-B-22	W9HH	15080-52-145-B-20
W8SIV	20250-45-180-A-33	W9OT	14915-38-159-A-12
W8ENA	17786-51-110-A-22	W9VWG	14076-46-153-B-29
W8AL	16060-44-148-A-37	W9GRK	11742-38-158-B-28
W8BKE	12950-37-140-A-19	W9BPR	9336-31-121-A-15
W8NSS	12920-38-136-A-40	W9VD	8405-41-103-B-21
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W8LOF	8693-38-92-A-13	W9HRM	3770-29-65-B-21
W8SHD	7388-30-100-A-13	W9LDC	3543-26-55-A-12
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W8QZB	4590-27-84-B-12	W9IDV	1200-12-51-B-12
W8JAJ	4455-22-83-A-29	W9GQO	825-11-30-A-11
W8LT	4200-28-60-A-3	W9DJI	718-14-21-A-7
W8IEH	4160-26-64-A-12	W9THU	440-11-16-A-6
W8GVL	3024-24-64-B-	W9IDE	413-11-17-A-4
W8QMN	2882-22-66-B-17	W9DWI	400-10-20-B-3
W8SIF	2332-22-53-B-	W9GLV	125-5-10-A-3
W8SCU	2262-29-40-B-20	W9LAD	120-6-10-B-4
W8RIW/8	1948-19-42-A-11	W9DNO/9	75-6-10-A-5
W8MOH	1935-18-43-A-7	W9NRX	61-4-9-B-8
W8LCO	1743-17-41-A-13	W9UJM	35-2-7-A-1
W8OPH	1665-18-37-A-9	W9IZQ	10-2-2-A-2
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W8THE	660-11-24-A-10	W9OFL*	308-11-14-B-
W8MFP	510-12-17-A-7	W9FCU	120-4-12-A-4
W8BCJ	494-5-41-A-	W9MPV	53-3-7-A-5
W8BEW	448-9-19-A-	W9CYO	30-3-4-A-2
W8TYX	376-7-22-A-4	W9NHG	26-1-11-A-15
W8LWG	330-11-12-A-3	W9HPZ	16-1-7-A-12
W8ULH	275-10-11-A-5		
W8PBX	270-8-14-A-		
W8TLQ	210-7-13-A-9		
W8UKI/8	158-7-9-A-5		
W8TSI*	144-8-9-B-6		
W8SQJ	96-7-11-A-		
W8TSF	85-5-6-A-2		
W8IRM	63-5-5-A-		
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W8QCG	24-3-4-B-1		
W8GER	23-3-3-A-1		

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W8SUL	25810-58-224-B-38	W9ZOU	57615-61-378-A-30
W8TPC	18270-58-158-B-32	W9AFK	20400-51-200-B-32
W8NDN	16271-53-151-B-30	W9VJH	10642-43-100-A-29
W8QAD	10988-47-117-B-34	W9DM	357-11-13-A-3
W8JXY	5343-39-69-B-18	Phone	
W8PXP	4999-31-65-A-	W9RPJ	3630-33-55-B-15
W8ODF	4560-31-80-B-		
W8NCV	4550-35-67-B-17		
W8RHG	4445-28-64-A-		
W8KZT	3696-33-57-B-12		
W8MGS	3696-33-57-B-12		
W8CDR	3712-27-55-A-15		
W8PNJ	3390-24-57-A-19		
W8VBG	2703-17-80-B-22		
W8DIJ	1775-25-36-B-8		
W8GVI	1701-21-41-B-		
W8BFB	1634-19-43-B-6		
W8QCG	912-15-26-B-6		
W8OPC	580-8-29-A-8		
W8TIZ	508-7-29-A-16		
W8UNV	224-7-17-B-		
W8PBX	172-3-23-A-		
W8LCO	75-5-6-A-2		
W8VBS	50-1-20-A-14		
W8TYF	33-1-13-A-4		
W8SUK*	2-1-1-B-		

Wisconsin		No. Minnesota	
W9VDY	88988-63-567-A-38	W9YCR	73160-62-473-A-40
W9RQM	88195-62-571-A-40	W9JRI	37400-55-340-B-37
W9CRK	80600-62-520-A-38	W9GFR	32984-56-300-B-40
W9DIR	78908-63-501-A-40	W9LAE	21266-49-218-B-
		W9HQW	10031-25-168-A-5
		W9KSC*	8060-31-104-A-18
		W9OYM	7000-40-89-B-12
		W9WUQ	4455-27-67-A-20
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(Contd. on page 94)

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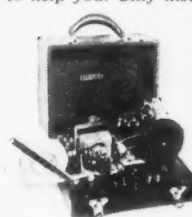
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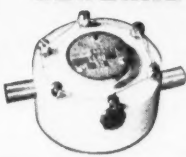
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(Continued from page 85)

for 1.8-Mc. 'phone and 3.5-Mc. c.w. MKI runs 40 watts to 6L6 on 3.5 and 7 Mc. and gets out FB. AQU, a new Ham at St. Cloud, has a 6L6 osc. with 10 watts. The officers for No. Minn. Amateur Radio Assn. Unit 2 are: ICU, Pres.; YKY, Vice-Pres.; HBI, Treas.; TEF, Secy. RTN is building new rig with 812's final and is active in AARS. FUZ sends A.R.R.L. O.B.S. daily at 8:15 A.M. on 3.9-Mc. 'phone and at 7:30 P.M. on 3.7-Mc. c.w. The Bemidji gang have their club station, NFU, ready and have an FB emergency power supply. LSC reports that the N.Y.A. station, RVA, will soon be ready to go. Many of the boys from school are going up for tickets. VVA boasts power up to 1 kw. on 3.9- and 14-Mc. 'phone. HEO is N.C.S. of the new 'phone net, which is being organized on 3.9 Mc. The MIN-DAK Radio Club will have a meeting Sunday afternoon June 15 at W9LSC, Glenwood. Welcome to all hams.

Traffic: W9DNY 189 FUZ 100 RTN 160 MKI 66 EHO 49 IGZ 16 EUR 6.

SOUTHERN MINNESOTA — SCM, Millard L. Bender, W9YNY — W9KUI is in Camp Robinson, Ark., in the 43rd Engineers, Co. F. GBZ has an electronic key. FAJ is active as EC. JSS is active on 1.75-Mc. 'phone and c.w. FAD has a new SX-24 receiver. UYZ works c.w. on 1.75 Mc. OMC has sold his complete station. We are sorry to have lost a very good traffic man. JOY is having wonderful results with c.w. on all bands. All the active members of the J.C.A.R.C. have signed up in the Supporting Division, A.E.C. TKX is in the Seventh Corps Area at WVU, Omaha, Nebr., as Junior Communications operator, learning to operate high speed transmitters. FWN is now located at Archbold, Ohio. VAF is adding an 811 to his final. JNC built an e.c.o. unit which works very well. DOB received his 30 w.p.m. sticker. QXL, ESZ and CSU have built fixed and mobile 56-Mc. rigs. MUL dropped in for a visit. VRY has been working some of those hard-to-get states on 1.75-Mc. 'phone for his W.A.S. certificate and only needs four more. ZAD has moved to a new location in Albert Lea and has a much better place to get up his antenna. KOB is putting up a new antenna on sixty foot poles. We need more men for emergency coordinators. BHY is completing the organization of the State. What we need most is good men to take over county areas. Most areas including two or more counties have been assigned to coordinators, but assistant coordinators are wanted to take over individual counties. Swanny has been very active and has put in a lot of time on this work. A letter to him or to the S.C.M. will take care of you. A bulletin will soon be issued to all coordinators from which maps can be prepared showing the location of all stations of the regional coordinators and their assistants. All railroads and highways should be located on these maps when you prepare them. Our map will locate the dispatcher offices of all the railroads. All members of the A.R.R.L. MN Net will be located as well as all the A.A.R.S. stations. Thus we can see at a glance what is going on. 73. — Millard.

Traffic: W9QXL 3 DOB 23 FUO 12 YXO 7 JNC 16 VAF-IYJ 1 BPK 69 YNQ 16.

MIDWEST DIVISION

IOWA — SCM, L. B. Vennard, W9PJR — WTD sent Red Cross message with club emergency powered rig and kite antenna. DIB is still working a 4-watt emergency rig and has 15 states to date. RRF, a new YL opr. at Waterloo, will be on 7 Mc. soon. RCY, new ham at Glenwood, worked 30 states in 5 weeks with K6TGP for a start. AJT got his R.C. message out OK. YZK is building a portable emergency rig. ACF is building around a pair HK54's. LWC moved to Hamburg. GQ got a tower on the house for a beam and hooked KB4HBX. MZM is working 1.75 Mc. and trying to get on 3.5 Mc. IXB moved to the country. HSA is in Shenandoah now and getting out nicely with low power. K6RCB moved to Shenandoah. WML, station of the Newton Radio Club lost tower in wind April 13th. HFE is operating on TL "L." AUO is Alternate for HFE on TL "L." CVG has more N.Y.A. traffic with QVA at the controls. CTQ is busy on trunk N at 8:30 P.M. He lost his feeder wires in a wind same day he replaced his tower. KLC is Alternate on TL "N" and also in Iowa 75 net at 12:45 P.M. each day. JIS got married. Congrats, Bill. LKL is net control for Iowa 75 Net on 3976 or 3956 each week day 12:45 P.M. NMA has schedule with MQY. ZYS has schedules with KAH and JGQ. KSS has a new 70-foot tower. MHC is N.Y.A. instructor at Cherokee. HMI has a new receiver. PUX took Class B. BAB got Class A. LZE is a new ham in the Section.

EFI is S.N.C.S. Iowa each evening. GKS schedules 9QMD and 5DDWW and is in F.T.S. He handled 11 Red Cross messages. CVU got a Meissner Signal Calibrator for band checking. MQY has schedules with NMA. SCA is on Ia. A.A.R.S. and wants more schedules. Cedar Rapids is getting lots of new hams. JMB hopes to have c.w. Net going soon as well as the emergency 'phone net. YQY got his Class A ticket. HJV is a new Sioux City ham. TJA is getting ready to go to the Navy. QNA is building a 400-watt 'phone rig. TKG took Class A exam, had as visitor W7GOH and family. ALC is on 3.5-Mc. c.w. again. QOQ is playing with 56 Mc. WMP gave a good demonstration on power factor. PHA is on the air again. RZY is ready to go with 200 watts on all bands. TMY had his appendix out and so has plenty of time for radio while recovering. A fine list of reports, gang. Let's get the emergency rigs ready for Field Day. 73 — Les.

Traffic: W9WTD-RCY-AJT 1 HFE 452 AUL 58 CVG 82 CAN 75 CGH 104 KWZ 68 FOK 26 HMK 6 KWH 32 LEE 20 LMT 26 PVN 117 PXI 68 KNR 514 CTQ 10 KLC 21 NMA 2 JAP 12 ZYS 7 EFI 94 GKS 287 CVU 17 MQY 18 SCA 47 ZQI 8 JMB 3 TKG 59 LAC 3 ALC 10 QOQ 5.

KANSAS — SCM, A. B. Unruh, W9AWP — Thanks to all the Coordinators, netters, and others who did splendid work in helping with the Red Cross test. In addition to the Coordinators listed last month, the following have been appointed: Lyon County, W9OES; Leavenworth County, VWV; Cowley County, ZVP; Rice County, BRQ. Ask the Coordinators or SCM for A.E.C. blanks. LGR, ensign in the N.C.R., has been called to active duty on the Atlantic coast. KGN has a portable-emergency rig with low power, and is using the big rig with 250 watts on 14-Mc. 'phone with a rotary beam. The following are new registrants in the Emergency Corps: BQW, GOY, BBM, ADM, OZF, KWA, KCS, HYF, LJO and IOU. FB, fellows — see you Field Day. ESL visited the Topeka gang over Easter holidays. BYV moved to town. WXY handled most of his traffic in A.A.R.S. net. PAH and YOS complain of scarcity of Red Cross messages to QSP — guess there were enough St. Louis hams cooperating, and no jam took place. CKV is using small e.c. rig on 1.75-Mc. 'phone and 3.5-Mc. c.w. and asks about Camp Robinson schedules. TVU reports most Red Cross messages sent direct on 7 Mc. TVU had a three band QSO with WPK on 1.75 'phone, 3.5- and 7-Mc. c.w. with reports better as frequency went up. LNW has a new S-20-R. A.A.R.S. cryptography course is keeping EYY busy. ZUA is making plans for new home with radio room in the basement. KCS has a schedule with 9MJU/5 at Camp Robinson, Ark., and says Guards from the home town chipped in to pay for the camp rig. WMY can handle North and South Dakota traffic. VBQ reports prospects for new A.E.C. members look favorable, although active hams are scarce in Lawrence. OZN makes B.P.L. for the fifth consecutive time; he rebuilt the rig with PP 811 final and has much sock. RPU is a new ham in Norton. ZAW received QSL from an old 7-Mc. Japanese QSO and says his OM is studying for a ham ticket. VRZ has a schedule with OES on Sundays. KXB has swell new e.c.o. BQW has two rigs for five-band 'phone and c.w. ICV handled traffic with 9KSY/5 at Camp Robinson, Ark., and says BQW, OZF, VWU, ABX and ICV handled Red Cross traffic. KWA is new Hays station, has 40 watt 'phone-c.w. rig. HYF has low power emergency rig and 150-watt c.w. rig. LJO has 6F6-6L6 c.w. emergency powered rig, and 70-watt rig with T220 final. FER is seeking cutting wheel for muck saw, wants to cut up big hunk of quartz. OES is acting president of Neosho Valley Club, since ZGB entered active N.C.R. service. DQJ is instructor at Burlington C.C.C. camp. FKD is instructor for N.Y.A. now and reports flocks of fellows getting ready for license. FRK has new job in Horton. YHH is police operator in Arkansas City and works 'phone on 3925 kc. VWV has PP-211 final with 400 watts and a 20 watt 1.75-Mc. 'phone; he keeps schedules with CWW via W5FXF. The Wichita club now meets in the City Library building and has a committee making plans for Field Day. CGZ left the Section for El Reno, Okla. GOY suggests more kw. rigs on KN and QKS nets to ride over Michigan net QRM! Plans are under way for changing the 3663 net freq. to 3610 (we hope — at least by time the summer season starts!). KCS is O.R.S. now that the basketball season is over. UQV has 56- and 112-Mc. equipment and will run 250 watts on 56 Mc. WMY is working mill overtime on press copy. DWC is still handling lots of K6 traffic. LFB plans new midget rig. CVN has PP-100TH's and e.c.o. on 3.9-Mc. 'phone. TYV is working for C.A.A. PGL has a good 56- and 112-Mc. rig. 73, "Abie."

Traffic: W9OZN 737 (WLUN 23) VBQ 361 DWC 216

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UQV 213 YOS 182 WMY 92 FER 89 AWP 74 WIN-KCS
72 AVW 67 GOY 37 ZUA 31 KPJ 30 ICV 29 EYY-NOH 25
LFB 24 FKD 21 NOF-OES 20 TVU 17 WXY 14 CKV 11
PAH 6 AEY-BYV 5 KXB 4 ESL 3 VVW-QQT-YHH 1.
(Feb.-Mar.: W9KJP 11).

MISSOURI — SCM, Miss Letha Allendorf, W9OUD —
Traffic and more traffic highlighted this month.
W9QMD was high man again with 1036 total — over a
hundred being Red Cross messages for St. Louis and Wash-
ington. AEJ tied for honors in the St. Louis area with ILIH,
both handling 101 Red Cross messages. EFC delivered 44
messages. JKI monitored 7 Mc. 20 hours during the test
and got two messages for St. Louis and 1 for Washington.
KIK received 19 R.C. messages and is building a new monitor.
GBJ is having trouble with his e.c.o. GCL gave Class C
exam to an XYL from Willard. ITW is rebuilding. CTB has
a new Sky Buddy, 6L6-pr 6L6GX rigs — and a 13 w.p.m.
code speed. NSU is recovering from the shock of handling
over 800 messages. WIS did his part in R.C. test as E.C.
RNK is rebuilding keying monitor and has a new mill with
which he hopes to increase his code speed. QXO handled
about 150 messages at the St. Pat's engineering exhibition
at M.U. IDK handled a nice bit of traffic on 1.75-Mc.
'phone. LTW worked 14 K's on 14 Mc. during the past
month with 25 watts doubling in 807 final, 130 end-fed an-
tenna and received 87 average reports. EDO built an e.c.o.
and is hoping for the best. KCG has to miss MO A occasion-
ally on Monday drill because the boss forgot to leave him a
day shift on Monday. DMR is planning a band switching
75-watt c.w.-'phone rig with 89 e.c.o., 2A5 and pr 6L6's,
grid bias modulated by a 2A5. RMI is trying to build a new
transmitter but is having difficulty getting the parts speci-
fied. GHD is new O.R.S. and piled up a nice total on his first
month of real traffic handling. QOC has QRM from local
dairyman who starts work about the same time as the nets.
HIC has enrolled in another night course at K. U., but will
continue on MO C. BWR's antenna blew down April 13th.
NAQ has a new job which prevents him operating on MO B.
KEI built a Stancor 10 P and has new QTH which he ex-
pects to be permanent as he bought the house. CZI tested
13-watt rig for emergency work and served as coordinator
for R.C. test with 100% cooperation from hams in the county.
Ex-9GIP, now 8UUS, visited in Sikeston. WNX has 350
watts on 28 Mc. FKF is back on 1.75 Mc. RLC is on 28 and
1.75 Mc. and VDG expects to go to 28 Mc. for the summer.
The Moarky hamfest is scheduled for Caruthersville on May
4th. The new A.A.R.S.-A.R.R.L. club in St. Louis, open to
A.A.R.S., O.R.S. and O.P.S. had its first meeting the end
of March and elected AEJ pres., KIK activities mgr. and
vice-pres., TBU secy. Present members are AEJ, KIK, JTG,
GHD, PUV, JKI, RNK, KEI and TBU. The club plans
A.R.R.L. affiliation and its aim is to increase interest in
traffic handling. Traffic-minded hams are invited to attend
meetings; the time and place can be learned from officers.
The O.A.R.C. held its regular monthly meeting at the
shack of P.I.J. a new ham in Jackson. ECV just received his
ticket at Lutesville. UYD has a new 807 final on 1.75 Mc.
TZX is rebuilding with T55's final. QMF is giving code
lessons to some prospects in Perryville. VMI is still handling
traffic on 3.9-Mc. 'phone. VLP is back at the old stand on
7-Mc. c.w. QAC is looking for a bigger modulator for his
85 watts. WRD also has an eye out for a modulator. TGG
is still waiting for 28 Mc. to come back strong. UKC is on 1.75
Mc. every Sunday morning. PUA works 3.9-Mc. 'phone and
YKR got his 25 w.p.m. sticker. TGN and QJP were called
up by the N.C.R. OUD is on the job on MO A, B and C, the
C.A. net and TL B — but went to third place on the traffic
roll. That's all, folks, and it was a swell bit of news. Keep
'em coming — and good fishing.

Traffic: W9QMD 1036 NSU 801 OUD 567 AEJ 481 QXO
251 NAQ 142 GHD 136 KIK 119 EFC 113 RMI 101 DMR
93 TBU 79 HIC 78 IDK 69 VMI 65 EDO 44 KEI-GBJ 30
LTW 32 WIS-CTB 25 JTG 21 WOC 15 RNK 13 NNZ 12
JQU-VDG 11 KCG 8 JKI 7 DWF 5 HZI 1.

NEBRASKA — SCM, Garold Bennett, W9WKP —
The Western Nebr. Radio Amateurs met at Cheyenne,
Wyo., April 9th at the Houge Radio & Supply Co. A fine
time was had by all and thanks to Chas. Houge. W7BCL is a
new member of the W.N.R.A., Wyo. B.M. Will, ex-W9QH,
is doing radio service in Cheyenne, Wyo. W9NEY now has
the call W7IOJ and is located in Cheyenne, Wyo. JRN is
operating portable at Cheyenne, Wyo. MTL is working 1.75-
Mc. 'phone and 7-Mc. c.w. KQX has a new SX-28, and is

working 1.75-Mc. 'phone with a powerful little five watter.
CDL is rebuilding with 6L6-807 exciter. SDL is back on
3.5-Mc. c.w. and 3.9-Mc. 'phone. TFP is now O.P.S. and
still curing B.C.L. trouble. CAA, A.R.R.L. Director of the
Rocky Mountain Division, visited meeting of W.N.R.A.
BQO of Denver was also a visitor of the W.N.R.A. meeting
at Cheyenne, Wyo. UCI is back from California. YXR is
busy farming. EWO is building a new e.c.o. and is putting in
a TW-75 in rig. We heard QWA on 1.75-Mc. 'phone; he has
been on 28 Mc. KMN is active on 7 Mc. and is working out
FB. JFJ received his Class A ticket and will be trying the
high frequencies on 'phone. OWR is showing the South
Eastern Nebr. Radio Club some movies. RUJ is reporting
into the Mink Emergency Net. The Net is increasing in
membership. Mink Emergency Net handled a lot of Red
Cross messages thru ZGX. AFH/9 reported Red Cross
message from his local Chapter to ZGX and AFH operating
with emergency powered equipment. Let's all get our emer-
gency powered rigs ready for Field Day in June. South
Eastern Nebr. Radio Club held a meeting at LPU on April
13. EHW is reporting into A.A.R.S. net again. GYM has a
pair of T55's on the air and is putting out a good sig. We
didn't hear from the Northeast gang this month. YLC is
active on 1.75-Mc. 'phone A.A.R.S. LEF is also helping with
A.A.R.S. Net. TQD is operating 9BB at Doane College.
I would like to thank you fellows for your votes in the recent
SCM election. I will be at your service at any time, so let's
hear from you.

Traffic: W9EOW 3 WKP 25.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Carl C. Drumeller, W9EHC —
RM's: EKZ, JWC and TDR. PAM: BQO. The usual
heading again this month: W9EKQ tops the traffic lists and
makes B.P.L. Fine work. Jim. Down at Colorado Springs,
KKY, the new E.C., hands in a fine score to take second
honors. From Wilkinsburg, Pa., ZFM reports he is planning
to get a W3 call; he, VTX, ex-W9OTM, and ex-W9YZS
are also near neighbors at his new QTH. We are sorry to
lose Albert, but hope to be able to contact him on the air.
The Greeley E.C., HWH, sent in some fb newspaper clip-
pings; Gib has been putting his emergency rig through
its paces. VGC, with the help of Robert Haas, did fine work
from Idaho Springs during the Red Cross Test; he used his
6A6-807 rig and Haas' 8-29 receiver. The Denver E.C.,
WYX, supplies the following highly-appreciated informa-
tion: Special credit on the Red Cross drill is due to VHC,
also to YFJ, who set up his station at the Chapter in Au-
rora, and to JBI, ESA and BQO, who handled traffic for
Denver. WYX had his station at R.C. Hdq. in Denver,
using 1.75-Mc. 'phone. Bob now has Class A. YCD has
been inducted into the Army. The Towner E.C., KHK, did
a job on the R.C. drill; Orval believes more amateurs should
coöperate in such affairs. The Brighton E.C., RGX, has a
gas-engine Dodge generator combination to run his emer-
gency rig; TX is giving him commendable coöperation.
NIT is graduating from C.U. in June; he has his station at
the University. BQO is doing a fine job as P.A.M. ADV is
doing most of the directing of the Colorado Traffic Net
since JWC lost his antenna pole. I notice that there are
now two nets known as the Colorado Traffic Net; the one
officially recognized is that organized by R.M. JWC, with
the aid of ADV. The Summitville E.C. reports helping
Cheyenne, Wyo., to make a Denver contact when a storm
cut off Cheyenne's communications. Thanks to HWH for
the following: RUP is a new man at Greeley, operating 7-Mc.
c.w. . . . PO is rebuilding his all-band rig. . . . OWP
has a 1.75-Mc. 'phone rig on at Windsor. . . . FQK is
heard on 7-Mc. c.w. at Boulder. The Paoli E.C., QYL,
handled R.C. drill traffic and is building up an fb emergency
station. PGX is in charge of the organization of the Ameri-
can Legion Net; give him your coöperation, fellows. The
Denver Hamfest was a total success, with everyone pres-
ent enjoying a very entertaining program. The Radio
Widows, Emergency Corps, Electron Club, Bell Radio
Club and A.A.R.O.D. were well represented. IVT won the
hidden transmitter hunt. Judging from the opposition to a
proposed request for a 20 w.p.m. code requirement for Class
A tickets, there must be a goodly number of Denver ama-
teurs who have no hopes of progressing beyond the lowest
requirement for a ticket. LUG is new E.C. for Longmont.
The La Junta E.C., NDM, has a new SX-25.

NOTICIA

The Radio Amateur's HANDBOOK en Castellano

Ha sido puesta en circulación la edición en Castellano de "THE RADIO AMATEUR'S HANDBOOK" traducida y editada, como en años anteriores, por "REVISTA TELEGRAFICA" de Buenos Aires, la revista de radio más antigua, de mayor prestigio y circulación en todos los países de habla castellana. —

La edición original de "THE RADIO AMATEUR'S HANDBOOK" 1941 no hace más que confirmar el al to prestigio adquirido en los últimos 15 años y que lo consagra como el manual típico en las actividades de alta frecuencia y radiocomunicaciones. —

Contiene treinta y dos capítulos con amplias explicaciones sobre experiencias realizadas y consejos acertados para la construcción de estaciones completas para radioaficionados y su manejo técnico y de manipulación. —

Inicia el libro dos capítulos de historia dedicados al principiante y a continuación van cuatro capítulos sobre principios y diseños, conteniendo además los elementos básicos de la radio en una forma muy comprensiva. —

En catorce capítulos siguientes se trata la construcción y ajuste de docenas de unidades de transmisión, recepción, fuentes de energía etc. La sección antena consta de cinco capítulos en los cuales cualquier aficionado puede hallar la solución de su problema. Otros cinco capítulos se dedican a las frecuencias ultra elevadas.

La modulación de frecuencia es otro tema tratado en el HANDBOOK 1941 sin olvidar los equipos portátiles de emergencia; medición y equipos de medición; tablas de características de más de 700 válvulas etc. —

"THE RADIO AMATEUR'S HANDBOOK" es, en síntesis, el esfuerzo de un organismo como la A.R.R.L. y el resultado práctico de muchas experiencias. Las innovaciones que contiene son de mérito probado. —

La traducción en Castellano, obra de "REVISTA TELEGRAFICA," de Buenos Aires, es el complemento ideal de ese esfuerzo. Se vende a \$6 moneda argentina ó \$1.50 oro americano. —

**Pedidos a la A.R.R.L., West
Hartford, Conn., E. U. de N. A.,
y por mayor a "REVISTA
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Buenos Aires, Argentina.**

(Contd. from page 90)

W9NYH 30740-58-213-A-34
W9QIN 15225-42-290-A-31
W9PL 13590-36-151-A- -
W9DOB 10454-39-143-B-20
W9GNG 4162-30- 59-A- -
W9VIP 3553-31- 51-A-11
W9EQH 3050-20- 62-A- 9
W9CGK 2445-19- 52-A-11
W9MCN 1233-17- 31-A- 8
W9TJP* 272- 8- 17- - -
W9ZAD 225- 9- 10-A- 3

Phone
W9ZDM 12- 2- 3-B- -

DELTA DIVISION

Arkansas
W5ELJ 25375-50-205-A-36
W5GWT 16720-44-152-A-36
W5DUI 16555-43-155-A-29
W5AQF 1632-24- 35-B-13
W5GWD 1375-20- 28-A-12
W5IRG 630-12- 22-A-10
W5EGY 144- 8- 9-A- 2
W5HYS* - - - - 61- - -

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W5HWK 17365-46-151-A-36
W5EGY 8569-41-106-B-13
W5FWD 6586-37- 90-B-37
W5FKQ 900-18- 26-B- -
W5HER* 2- 1- 1- - -

Louisiana
W5KC 81763-62-529-A-40
W5WG 71025-60-474-A-38
W5INL 14300-44-132-A-24
W5IYL 7481-35- 88-A-21
W5IKP 5851-31- 77-A- -
W5JET 1800-24- 33-A- 9
W5BZR 832-16- 26-B- 8
W5FXW 672-16- 21-B- 7
W5HWE* 10- 2- 2-A- -
W5HOU* - - - - 11- - -

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W5IRO 22700-50-227-B-34
W5HOU 10656-48-111-B-21
W5ADJ 5408-26-104-B-22
W5HNW 2178-22- 50-B-11
W5BQD 990-15- 33-B- 7
W5IKP 75- 3- 10-A- -

Mississippi
W5AVF 59074-59-401-A-32
W5JDR 1800-20- 36-A-11
W5HRX 460- 7- 28-A-11
W5SU/5* 192- 8- 12- - -

Tennessee
W4FCF 27338-45-259-A-25
W4FDT* 18840-48-157-A-24
W4AYV 7523-34- 89-A- -
W4HAM 113- 6- 8-A- 3
W4DDJ* 105- 7- 8-B- 3
W4ZZ* 40- 4- 5- - -

Phone
W4DUS 7992-37-112-B-15
W4GGR 4263-29- 75-B-26

HUDSON DIVISION

E. New York
W2EWD 41069-55-327-A-40
W2EGG 31980-55-326-B- -
W2IZO 15750-36-175-A-18
W2KFN 14709-41-144-A-34
W2LDS 14000-35-200-B-33
W2LRZ 10374-42-124-B-27
W2KSP* 9225-30-123-A-13
W2NCG 9068-26-142-A-25
W2NIY 8938-25-143-A-18
W2LH 5440-34- 65-A-29
W2MIY 5250-25- 81-A- 9
W2MZR 3136-28- 56-B-16

W2MUH 1710-19- 36-A-12
W2LLU 750-12- 26-A- 5
W2DIJ 405- 9- 18-A- 2
W2JIC* 20- 2- 4-A- 1
W2LSG 18- 3- 3-B- 1

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W2MEC 2686-34- 40-B-12
W2EGG 1975-25- 40-B- -

N. Y. C. & L. I.
W2IOP 57350-59-672-A-37
W2HHF 88970-62-577-A-40
W2MEL 70395-57-500-A-40
W2AYJ 57820-50-392-A-35
W2HUG 56478-58-390-A-38
W2AV 53872-56-481-B-40
W2MEM 44775-60-300-A-31
W2LPJ 41400-48-345-A-40
W2DXL 43335-54-322-A-36
W2KYV 39063-50-313-A-37
W2AGW 38500-55-350-B-35
W2KZP 35888-55-267-A-39
W2AOD 35606-45-317-A-37
W2NDQ 33158-59-281-B-12
W2BWC 32895-43-307-A-27
W2AEE 32195-47-275-A-29
W2KKU 28688-50-231-A-27
W2LIF 28013-54-210-A-17
W2BGV 27720-44-252-A-31
W2GP 25630-44-233-A-34
W2AHC 25404-58-216-B-24
W2AJL 25380-54-235-B-30
W2KGN/2 20801-43-194-A-21
W2DKF 19410-45-216-B-30
W2BZS 13800-46-152-B-31
W2GGN 12943-31-167-A-29
W2MOY 10855-26-168-A-28
W2MVJ 9960-32-132-A-28
W2MVX 6380-35-137-B-13
W2EIC 9280-40-116-B-22
W2CKQ 8088-31-105-A- -
W2MXP 7600-32- 95-A-12
W2MJO 7575-30-102-A-31
W2MHD 7070-28-101-A-19
W2JAU 6885-27-105-A-14
W2MZB 6720-32- 84-A-16
W2ICO 5250-30- 70-A-12
W2DCW 4563-25- 73-A-25
W2LKR 4515-21- 86-A-24
W2KNB 4453-26- 60-A- 8
W2EYS 3650-20- 73-A- -
W2HHD 3625-25- 58-A- 8
W2LUC 3225-25- 65-B-12
W2DUS 3136-28- 56-B-16
W2MDW 3010-28- 43-A- -
W2MXB 2675-20- 54-A-16
W2EC 1944-18- 54-B- 4
W2JB 1462-17- 43-B- 6
W2MCI 1256-15- 34-A- 6
W2ANX 1230-15- 41-B- 7
W2FTX 1015-14- 29-A- -
W2HVR 988-10- 26-B- 5
W2LUT* 420-10- 21-B- -
W2LGK 300- 8- 15-A- 5
W2HGO 196- 7- 14-B- 4
W2MHE 162- 6- 14- - -
W2LJC 24- 3- 4- - -
W2KVL* - - - 427- - -
W2HG* - - - 91- - -
W2LR* - - - 68- - -

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W2HAW 5940-33- 91-B-22
W2LHQ 4316-26- 83-B-33
W2HYJ 1950-15- 53-A-21
W2DXK 1300-20- 33-B- 7
W2LWW 650-10- 33-B-11
W2KVH 495-12- 17-A- 4
W2LUG 410- 4- 41-A-17
W2LXY* 350-10- 18- - -
W2LUX 209- 5- 22-A-16
W2DOG 240- 8- 13-B- 5
W2MIV 188- 5- 13-A-14
W2LZU 180- 8- 9-A-10

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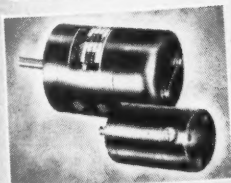
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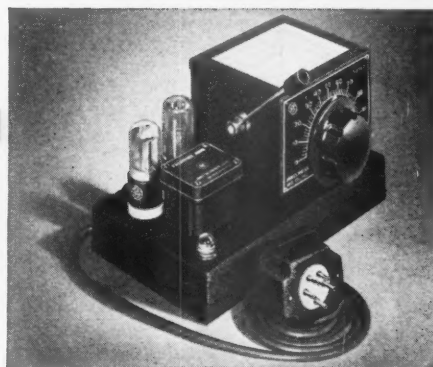
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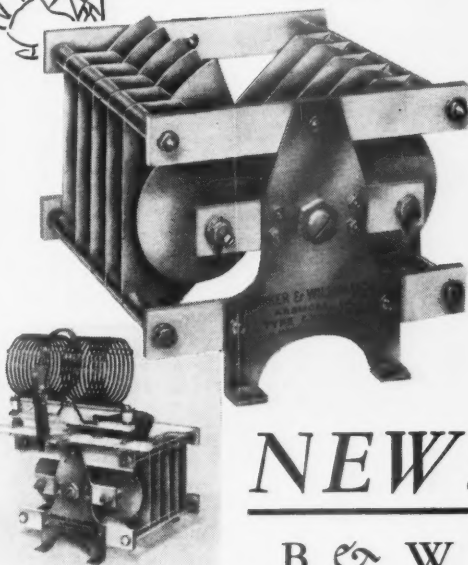


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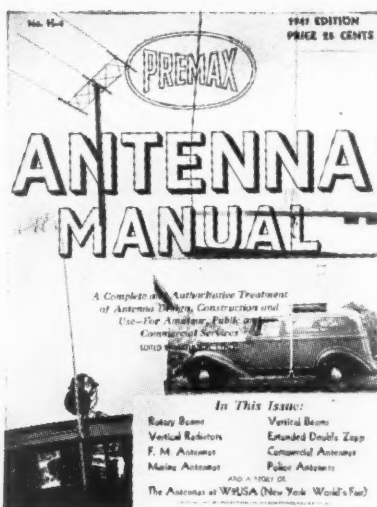
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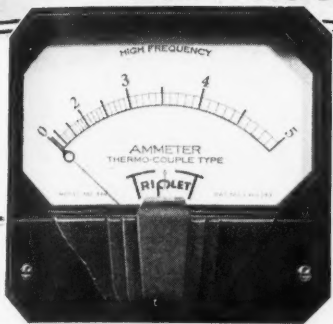
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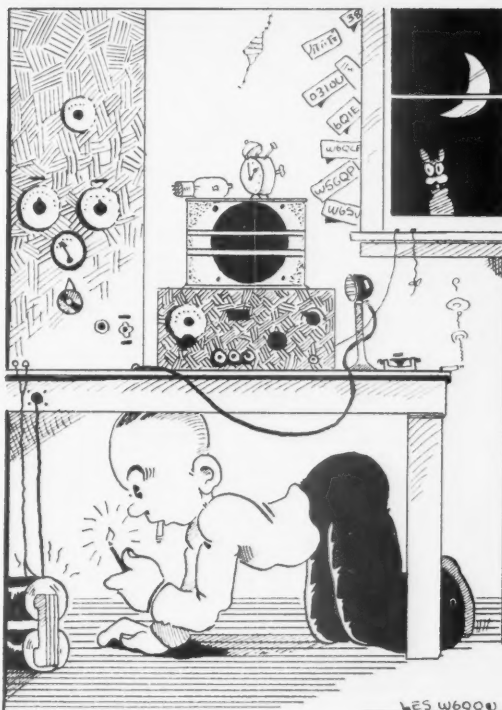


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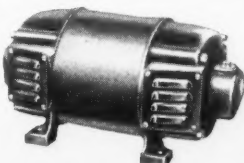


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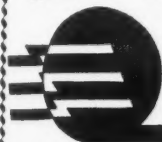
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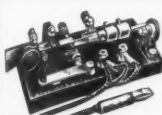
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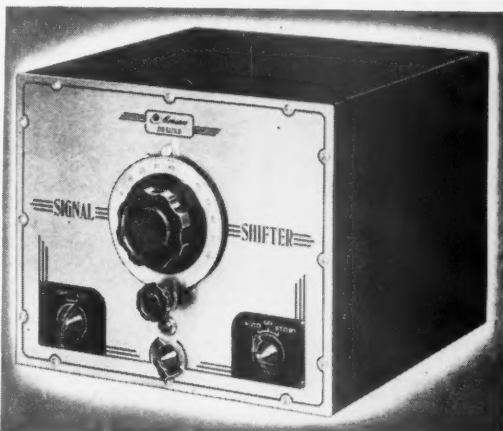
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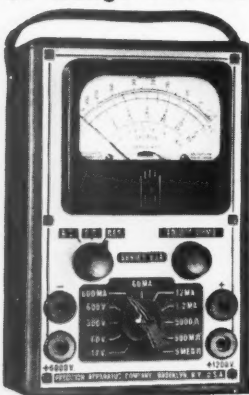
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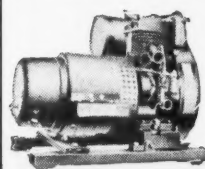
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